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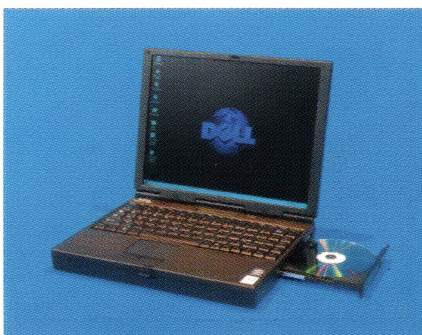
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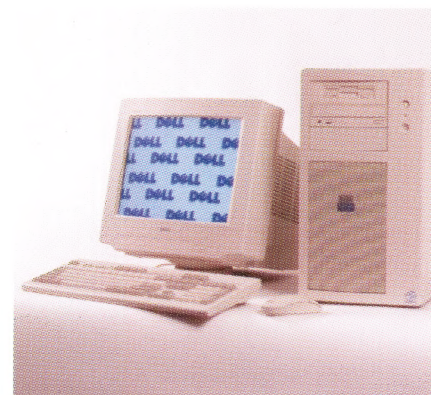
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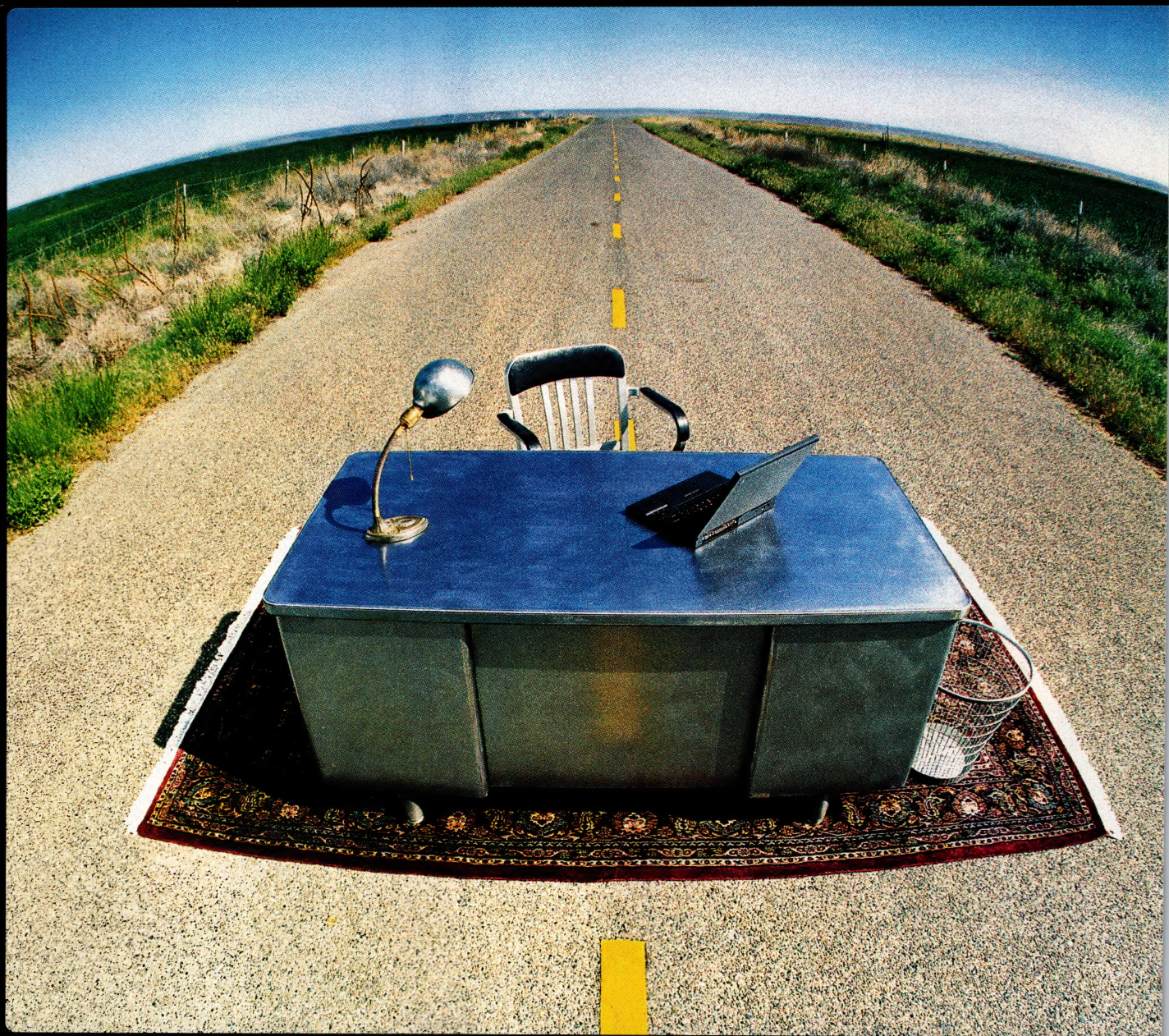
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Caught out

I often get caught out at newsagencies. I'm not one of those guys who stands flicking through *Personal Investment* and *Fortune* as a cover for looking at a girlie magazine. I'm not one of those guys who guiltily grabs *The Australian*, and then furtively secretes a copy of *Readers Wives* or *Rubber Times*. I'm not even one of those guys who buys *Who Weekly*, *Cosmo* or *Woman's Day* pretending it's for their partner when really it's for them.

I'm much worse. I'm one of that group — comprised of both males and females — that lurks around newsagencies watching other people buy magazines. The world knows us as 'editors'.

I know I hate the feeling that someone is watching me. So I try to be discrete. I try not to stand too close to other people.

You can always pick a magazine editor in a newsagency. They'll stand slightly to the left of the appropriate section . . . for a long time . . . holding one magazine — usually their most hated competitor. They'll read the same article on the same page for ages at a time, occasionally muttering, "What rubbish."

They'll be intently watching customers. Which magazines do they pick up? Which articles are they looking at? Do they look at the contents page? Are they paying any attention to the cover CD? And, worst of all, do they read the Editor's page up the front and then throw the magazine back down in disgust?

I know I hate the feeling that someone is watching me. So I try to be discrete. I try not to stand too close to other people; I try even harder not to point out what a great magazine APC is when they pick it up. And I try harder still to muffle my delight when

they put back a competitor and walk to the counter with APC.

But I often get caught. I'll be innocently standing reading *Computer Consultant* or some other innocuous title, and at the same time watching a customer browsing the computer titles, and then, as they start reading through APC, I'll edge closer to see what they're looking at. All of a sudden, they'll turn back to the Editor's page, see my mugshot, and turn round to catch me gawking at them.

That's an awkward moment.

I read a column by Tim Bowden last month in the Qantas inflight magazine in which he admitted that as an author he likes going to bookshops to see if anyone's

buying his books. Apparently, an author seeing someone buy their book is quite rare. Journalists have it much easier. If you work on a newspaper or monthly magazine with a reasonably high circulation, you have a good chance of seeing someone buying or reading your magazine or newspaper.

My own personal obsession goes back a long way. At uni I used to write for the student newspaper. The day an edition came out I'd wander around every campus coffee shop and eatery I could find, casually or not so casually glancing over people's shoulders to see if they were reading my article.

I quite frequently see people sitting on trains or planes reading APC. I've even overheard people having conversations about the magazine. However, nothing quite compares to watching the entire purchasing process. It is genuinely enlighten-

Hanging around newsagencies looking like a weirdo is all part of the job.

By Jeremy White

ing to observe someone walking into a newsagency and being confronted by the mass of choices in the computer section, narrowing down their shortlist, and actually buying 'your' magazine.

You'd think that online publishing would have cured my affliction. But I've found it to be a mixed bag as far as trying to understand our readers' desires is concerned. From log files you can see who looked at what for how long, the paths they followed, how they arrived, how they left. You can statistically analyse all this information. But more often than not it leaves me cold.

However, online is good for individual contact. I'd like very much to thank all the readers who filled out our reader survey, particularly the large majority who completed the extended version online. The anecdotal comments, ratings, complaints and advice we have received are incredibly useful.

I'd also like to thank the rapidly increasing number of users of our online discussion forums, those who email us, and indeed everyone who voted for us as Most Popular Australian Web Site in the Telstra/AFR Awards, in which we were a finalist.

This month we've included what we think is a really hot bonus double CD pack. In addition to the regular **apc-mag.cd**, we've included a special edition with the top 200 downloads of the year on a single disc for the same cover price as normal, as a way of saying thank you for your support and feedback this past year.

This kind of interaction, far more than log file analysis, gives us guidance on where we should be taking the magazine and what we need to do to keep improving it and making it ever more useful.

In the meantime, if you catch me in a newsagency glancing over your shoulder, please have patience with a curious editor! ■

NEWSWIRE

19

News roundup	19
Microsoft: See you in court	19
Can Java reach its potential?	19
Digital and Intel settle	22
1Mbps modem on the way	22
IT services in the money	24
Telstra plots kiosks rollout	24
Web users hooked on book look	24
Processor firms plan the chip of 1998	26
Wanted: IT staff	26

NEWS ANALYSIS

Blood money	28
Windows of opportunity	30

FORUM

52

READERS' SAY

52

TWO BITS WORTH

Helen Dancer	
Sticky fingers	54
Jeremy Horey	
The control geek	56
Jeremy Torr	
Don't judge a book by its cover	58
Bruce McCabe	
The silly season	60
Phillip Argy	
Knock knock. Who's there?	62

PRICE WATCH

56Kbps modems are the target for the Price Watch team this month.	65
-------------------------------------------------------------------	----

SERVICE AND RELIABILITY

Bargain prices for PCs are not an excuse for retailers to off-load defective or mechanically-inferior machines.	67
-----------------------------------------------------------------------------------------------------------------	----

CORPORATE

Are computers really the time-saving tools we proclaim them to be?	68
--------------------------------------------------------------------	----

SMALL BUSINESS

Big software companies are catering to the networking needs of small business.	70
--------------------------------------------------------------------------------	----

FAMILY

Age and gender are major factors in recent studies into computer use in the home.	72
-----------------------------------------------------------------------------------	----

REPROGRAMMING

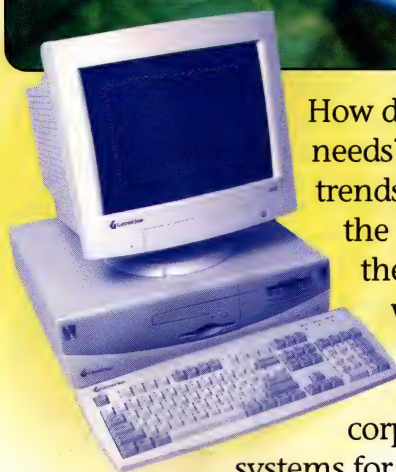
Discarded computers become hazardous waste — which Australia exports to Asia.	74
-------------------------------------------------------------------------------	----



APC LABS TESTS 37 HOT NEW PCs

PCs SPEED & POWER

We rate the best home, office and power user systems



How do you choose the best PC for your needs? APC's annual PC review tracks the trends and changes in three core areas of the PC market: consumer machines for the home market, high-tech workstations for performance fan-

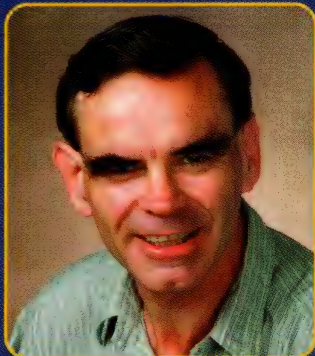
atics,
and
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systems for the office and business market. Detailed analysis combined with APC Labs performance evaluations of 37 systems form your essential guide to PC purchasing in the months ahead.
By APC staff

Consumer choices	112
Editor's Choice	114
Workstation choices	119
Editor's Choice	122
Super graphics	122
How we tested	123
Corporate choices	128
Editor's Choice	130
Warranties	132

PROFILE

77



AN AUSTRALIAN ODYSSEY

The highly respected Australian technologist Vaughan Pratt played a crucial role in the early days of Sun Microsystems. He spoke to APC about the Silicon Valley success story and opportunities for Australian IT visionaries.

By Dan Tebbutt

FEATURE

80

THE GEEK LOTTERY

Is Australia ready to profit from technology?

On the way up 80

By Helen Dancer

'Boys' go global 82

By Helen Dancer

Pushing the envelope 86

By Helen Dancer

The geek lottery 93

By Dan Tebbutt

Australians can LookSmart 97

By Dan Tebbutt

Infoscape: The new 49ers 99

By Dan Tebbutt



HARDWARE

137

NETPCs FACE THE TEST

NetPCs are finally beginning to appear on the market. We take a look at the standard features, and compare three machines. 137

By Nathan Taylor



SOFTWARE

141

STOCKING FILLERS

Christmas delights for everyone from the workaholic and the Netsetter, to the serious game player and the total Butt-head. 141

By Cathie Kennedy

Top 200 downloads 143



TECHNICAL

101

THE PC OF 98

The PC of the future will have new architectures and a DVD drive, among a host of other OS and hardware developments. 101

By Nathan Taylor
and Ashton Mills

REPLICATING THE WEB

Will the Distribution and Replication Protocol become a standard and provide us with better Net performance? 107

By Angus Kidman



Beavis and Butt-head Multimedia
Screensaver

Collier's Encyclopedia 1998

Home and Garden

Jedi Knight: Dark Forces II

MasterPublisher 97

Microsoft Home
Essentials 97

NetAccelerator

Norton Utilities Version 2.0 and
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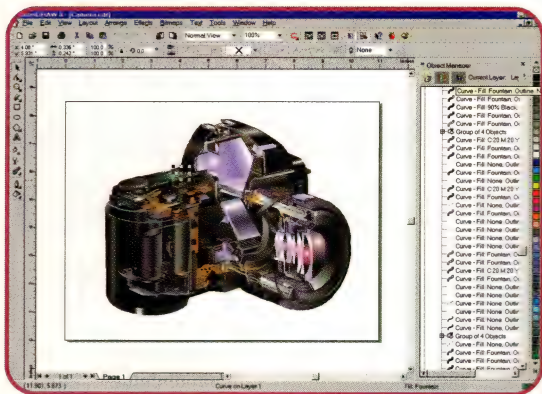
32

MICROSOFT WINDOWS NT 5.0

The latest version of NT incorporates a host of new enterprise features. 32
By Lachlan Botticchio

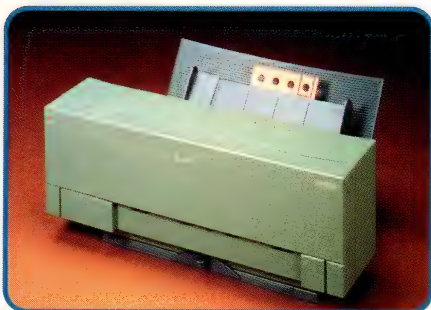
CORELDRAW 8

Corel keeps the enhancements coming. 36
By Jim Endersby



ALPS MD-1000

Thermal colour-printing process produces impressive quality. 38
By Jeremy Torr



SYMANTEC PCANYWHERE32 8.0

The latest version of Symantec's remote connectivity product. 38
By Dominique Jackson

VITALSIGNS NET.MEDIC

A diagnostic tool for Internet-related problems. 40
By Travis Simon

MICROSOFT PROJECT 98

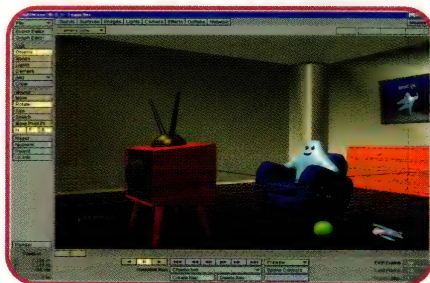
A powerful tool for managing large projects. 42
By John Hepworth

NIKON COOLPIX 300

Do you need a personal imaging assistant? 44
By Jeremy Torr

VENTURE NOVASTATION

Wavetable playback for 16-bit soundcards. 44
By Angus Kidman



LIGHTWAVE 3D 5.5

A professional tool for 3D modelling and animation. 48
By Philip Moore

AFTER HOURS

219

BIBLIOFILE

Learning and using Microsoft Office 97 219
Perspective: Human endeavour 222

INTERACTIVE

Be an Aussie wild child, drink some Victorian wine and have Antarctica brought to you. 223
Interactive news 224

GAMEZONE

It's sequels galore, with Riven rising above Myst, Hexen II giving you much more to shoot, and Lands of Lore delving into new epic dimensions. Plus treats for Trekkies and fans of God games and real time strategy. 225

WEB FILE

Pop into Santa's site, do a spot of shopping and remember why you never say diet. 229
Surfbaud: The 12 days of Christmas 230

CHIP CHAT

Chip Chat gets teary about IE4, nostalgic about '80s rock and console games, gaga about the Spice Girls and downright obscene about Microsoft marketing. 232
Contest: We're with stupid 232

CD CONTENTS 12

ADVERTISERS' INDEX 12

CREDITS 14

MARKETPLACE 205

CD INFORMATION 217

CONTACT INFORMATION 14, 217

WORKSHOP

150

TECH TALK

Technobabble: The pros and cons of RISC and CISC 150
By Nathan Taylor
Step by Step: What to do when it won't Plug and Play 152

OPERATING SYSTEMS

Networking your home PCs using Windows 95 154
By Gareth Jones
How to make the most of OS/2's built-in archive feature 156
By Ashton Mills
Useful extras on the Mac OS 8 installation CD 158
By Stephen Withers



Getting Linux essentials up and running 160
By Geoffrey Bennett

PROGRAMMING

Developers corner: Floating point programming 162
By Michael Smith
JavaScript: Recursion, I/O functions and top-down programming 164
By Travis Simon
HyperText: Spiders, bots and META tags 166
By Lee Borkman

SHAREWARE

Shareware summary 168



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Volume 2.12, December 1997

Welcome to APC's two-CD special issue. This month we give you two CDs (over 1.2G of software) full of the latest software from around the globe. CD 1 is a special-edition CD that contains the hottest 200 shareware programs as judged by APC staff. CD 2 is in our regular apcmag.cd format. You'll find its contents listed in full inside the cover CD pack. Below is the full list of downloads available on our special bonus CD 1. See also our picks from the CD on page 143 of the magazine.

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System Tools:

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Multimedia and Design:

ACDSee32 2.2 ■ AVI to QT 1.1 ■ Cakewalk Pro Audio 6.0 ■ CoolEdit 96 ■ GUICoder 0.9b ■ Graphic Converter 2.9.1 ■ HyperSnap-DX 3.05.01 ■ CompuPIC 1.61 ■ LView Pro 2.0.0.1 ■ MIDIMan 2.5.7 ■ Microsoft GIF Animator 1.0 ■ Paint Shop Pro 4.12 ■ Picture Extremator 1.0 ■ Pixel 3D 1.071 ■ Screen Ruler 1.0 ■ ThumbsPlus 3.0g1 ■ VuePrint Pro 5.1e ■ Xing MPEG Player 3.12 ■ Adobe Photo-shop 4.01 ■ CD Wizard 4.32

Programming and Web Editing:

ActiveX Control Pad 2.7 ■ Adobe PageMill 2.0 ■ AnetHelpTool 1.0 ■ Borland C++ Builder 1.0 ■ Claris Homepage 2.0 ■ Development Assistant for C 3.00 ■ Egor Animator 3.4 ■ Fox 2.0 ■ HTML Reference Library 3.0 ■ HomeSite 2.5a ■ HotDog Pro 4.01 ■ Install-us Wizard 2.2 ■ JBC 1.0 ■ MR Tech Submit Spider 3.8.58 ■ MakeNav 1.007 ■ MapEdit 2.3 ■ Super NoteTab 2.63e ■ TextPad 32 3.1.01 ■ WISE Installation System 5.0f ■ Web Wizard 1.2

Advertising index

Acer	39,	Primax	76
Also Technology	113	Protocol	79
Alpha	125	Ricoh	49
ASP	135	Sony	89
Auslinx	131	Synnex/Mitac	IBC, 129
Beyond	15	Telstra Big Pond	2, 3
Canon	50, 51, 53, 55, 57, 59, 61, 63	Telstra Multimedia	26
Clarix	25	Toshiba	29, 43
Creative Pacific	9, 75	Viewsonic	83, 85, 87
Cybec	64	Video Bytes	21
Dell	IFC, 1 Gatefold	Westan	11
Dynalink	37	Xircom	45
Edge	218, 221	Yamaha	71
Elcomp	120, 121	Channel	
Epson	31, 94, 95	New Magic	169
Giganet	147	Flextools	170
Hearne Scientific Software	136	Landmark	171
Hewlett-Packard	46, 47		
Hyundai	13, 34, 35	SuperMarket	
Innovision	140	Step Up Systems	172
Intel	113, 127	Net Gear	173
Keap	105	Software Today	174, 175
KOA	27	New Reality	176, 177
LG Electronics	23	Dragon Dictate	178
Lotus	4, 5	Intelligent Printing	179
Magtron	117	City Software	180, 181
Microgram	109	Corporate Software	182, 183
Micropro	OBC	Micro Tech	184
Microsoft	16, 17	Adelong Computers	185-200
Microstar	110	Landmark	201
NEC	69	Rod Irving	202
News Interactive	139	Sigmacom	203
OzEmail	73, 100	Australian Corporate	204
Powerquest	106	Butek	205



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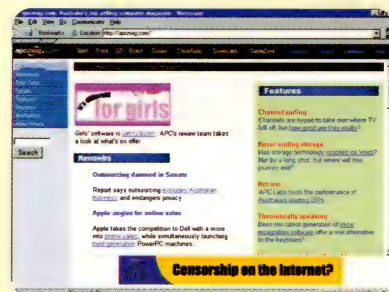
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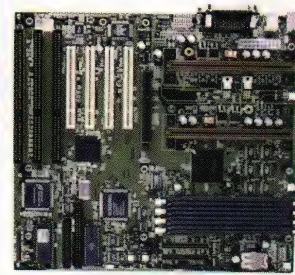
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DEVELOPER VIEW

Can Java reach its potential?

Much of the current argument over Java implementation (see story, right) centres around two issues: whether Java can be used to develop effective applications at all, and whether it can really be used effectively to create applications that run on any platform. Australian Java developers interviewed by APC said that while the former is definitely possible, the latter presents major problems. Indeed, differences between browsers running on the same OS platform can be just as challenging as trying to deploy on entirely different platforms.

"It is possible to ship commercial-quality software written in Java today," said David Wood, managing director of Plugged In Software, a specialist Java developer. According to Wood, though, developers must change Java's 'write once, run anywhere' slogan to 'write once, test everywhere', because of the subtle variations between platforms.

These variations exist not only between different com-

Continued on page 20

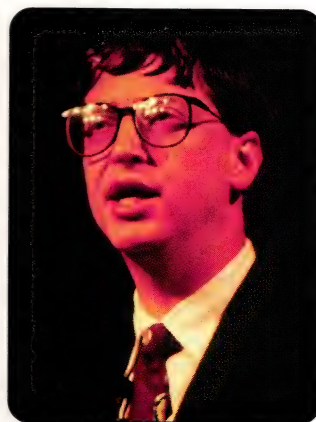
DOJ, SUN MOUNT LEGAL BATTLES

Microsoft: See you in court

With two major lawsuits on its doorstep, both of which threaten to drag out for months, Microsoft looks set to spend more time in courtrooms than in development in the foreseeable future.

Following closely on the heels of Sun's lawsuit against Microsoft for violating the terms of its Java licence (see APC November, page 20), the software giant was slapped with a civil lawsuit by the US Department of Justice (DOJ) for allegedly violating the terms of a 1995 consent decree designed to stop it using anti-competitive licensing practices. Neither case had been resolved when this issue of APC went to press.

The DOJ dispute centres around the terms under which Microsoft licenses Windows 95 to original equipment manufacturers (OEMs). One of these terms is that Internet Explorer (IE) must be included on every machine. The DOJ contends that, since IE is in its view a separate product, the practice is anticompetitive and violates the terms of a 1995 con-



sent decree which Microsoft signed following concerns expressed by OEMs that its licensing practices were unfair. Under the terms of that decree, Microsoft is not allowed to force OEMs to license other Microsoft products in order to license Windows 95. "Microsoft is unlawfully taking advantage of its Windows monopoly to protect and extend that monopoly and undermine consumer choice," said US Attorney General Janet Reno in a statement.

The terms of the current lawsuit are narrowly defined, and don't impinge on other

areas where concerns about Microsoft practices have been expressed, such as its plan to integrate IE into the very core of Windows 98, or its recent deal to include IE as the default browser for the Mac OS. However, that does not mean these might not later be the subject of a separate investigation. "We have an ongoing and wide-ranging investigation to determine whether Microsoft's actions are stifling innovation and consumer choice," said Joel Klein, the DOJ's antitrust attorney. In particular, the department expressed concerns over whether Microsoft is trying to halt platform innovation and obstructing the development of technologies such as Java.

On both fronts, Microsoft has maintained a consistent stance of denying any wrongdoing. "Of course we're disappointed that the DOJ has taken this action," said Microsoft's senior vice-president for law and corporate affairs, William Neukom. "However, we are confident

Continued on page 20



News roundup

As its plans for exploiting the information economy move into high gear, the Federal Government has announced that it will create a central authentication body to supervise schemes for secure electronic transactions. "The Government has agreed to facilitate the creation of a new peak body, which will oversee the development of a national system for online authentication," Senator

Richard Alston, the Minister for Communications, the Information Economy and the Arts, proudly proclaimed in mid-October. In keeping with the government's avowed preference for leaving the development of electronic commerce and information services to private enterprise, the peak body will act in a supervisory role, and will not for the most part restrict authentication to a particular class of services or standards.

Meanwhile, the chairperson of the CSIRO has warned that any attempts to exploit

technology for economic gain must be tied into existing areas of natural advantage. "The likelihood of scientific progress in a particular field should combine with the nation's ability to capture it," Charles Allen said. "Such knowledge-based industrial successes arise from clusters of researchers and highly-competitive companies, which is what we have in mining and also in agriculture."

At the same time, new research from UNSW's corporate research arm Unisearch has called for greater coordination between

Java: What developers like (and hate)

- ✓ Ability to develop cross-platform applications
- ✓ Ease of access to legacy system data
- ✓ Forces focus on object-oriented approach

- ✗ Inconsistencies between JVMs
- ✗ Lack of mature development tools
- ✗ Performance issues



Can Java reach its potential?

Continued from page 19

puting platforms such as the various flavours of Windows, Unix and Mac OS (not to mention minicomputers and handheld devices), but also between different Java Virtual Machines. Even the JVMs shipped by Sun in its JDK, JavaStation and Java Workshop have different bugs, he said.

This situation should improve if a promised unified JVM from Sun, Netscape and IBM actually materialises, but that would still leave developers to contend with Microsoft's JVM as well as embedded device versions of Java.

Quinton Wall, senior developer at Lojiks, has a less pessimistic view. Java is "a really good environment to work in", Wall said, especially for making data stored in legacy systems readily available.

Portability has "got a lot better since I started [using Java]", said Wall, explaining that most of the differences between implementations lie in the Abstract Window Tool-

kit (AWT). This means that the main logic of a program will work correctly when moved to a different environment, but it can be hard to get a consistent appearance.

It is even possible that most of the time that is saved by using Java for a project can be consumed by the struggle to get the program to work in both Navigator and Internet Explorer, Wall said.

Nonetheless, the extended market offered by Java is at the core of its appeal. Writing software for the Wintel platform might give you access to 80% of the market, said Plugged In's Wood, but so does writing for Netscape. As Internet Explorer also runs applets your software is potentially compatible with close to 100% of the market.

Another problem is that commercial Java IDEs (integrated development environments), although improving, are still bug-prone. "Everything's moving rapidly and [tool vendors] are struggling to keep up," Wall said.

Stephen Withers

Microsoft: See you in court

Continued from page 19

that the court will find we are compliant with the consent decree." Neukom said a clause in the 1995 consent decree explicitly allows Microsoft to add new features to its operating system. "I'm afraid that the government may misunderstand the meaning of that provision in the consent decree."

"IE is an umbrella term used to refer to various combinations of Internet-related and other technologies developed by Microsoft. IE is not simply 'browsing' software used to view information on the Internet. Consequently, any requirement that Microsoft rip technologies referred to as IE out of Windows 95 would degrade the operating system, to the serious detriment of personal computer users," Microsoft contended in its initial legal response to the case.

The US action could have local repercussions for Microsoft as well. The Australian Competition and Consumer Commission will await the outcome of the DOJ case before launching any investigations into Microsoft's licensing practices in Australia, ACCC representative Lin Enright told APC.

Enright said it was unclear whether Australian law, such as the Trade Practices Act, allowed for such an investigation in Australia, but said that if the US court agrees with the

DOJ's charges, the ACCC would probably look at Microsoft's practices here.

The ongoing court case between Microsoft and Sun has also taken a new twist, with Microsoft filing a countersuit against Sun, alleging breach of contract on Sun's part, as well as breach of contractual good faith covenants and unfair competition.

"Sun has apparently decided that it no longer likes the deal it made more than a year and a half ago," Microsoft associate general counsel Tom Burt said in a statement on the company's Web site. "Sun's suit may make for good PR, but its claims are not grounded in fact or in law. We are disappointed that it has come to this, but we have upheld our end of the bargain. Sun has not."

CEO Bill Gates has also spoken out on the dispute. He told Reuters reporters in Switzerland that the dispute demonstrated that Java was still not an open standard and was controlled by Sun. He also accused the company of having a strong anti-PC stance.

"They have always hated PCs. They think PCs give people too much freedom, too much power, and they campaign against the PC," Gates said.

Angus Kidman, Josh Gliddon and Dan Tebbutt

Page 30: News analysis: Windows of opportunity



News roundup

public and private research and development programs. It points the finger at the public sector for failing to maximise the economic potential of its R&D programs — 90% of private sector spending on R&D is oriented towards producing direct economic benefits, in contrast to 40% of the public sector's R&D expenditure. Overall, 60% of the \$6 billion spent on R&D in Australia has direct economic objec-

tives, with the other 40% aimed at general research and increasing the knowledge base. The report, which surveyed 800 companies across Australia, identified IT as the major source for new R&D programs.

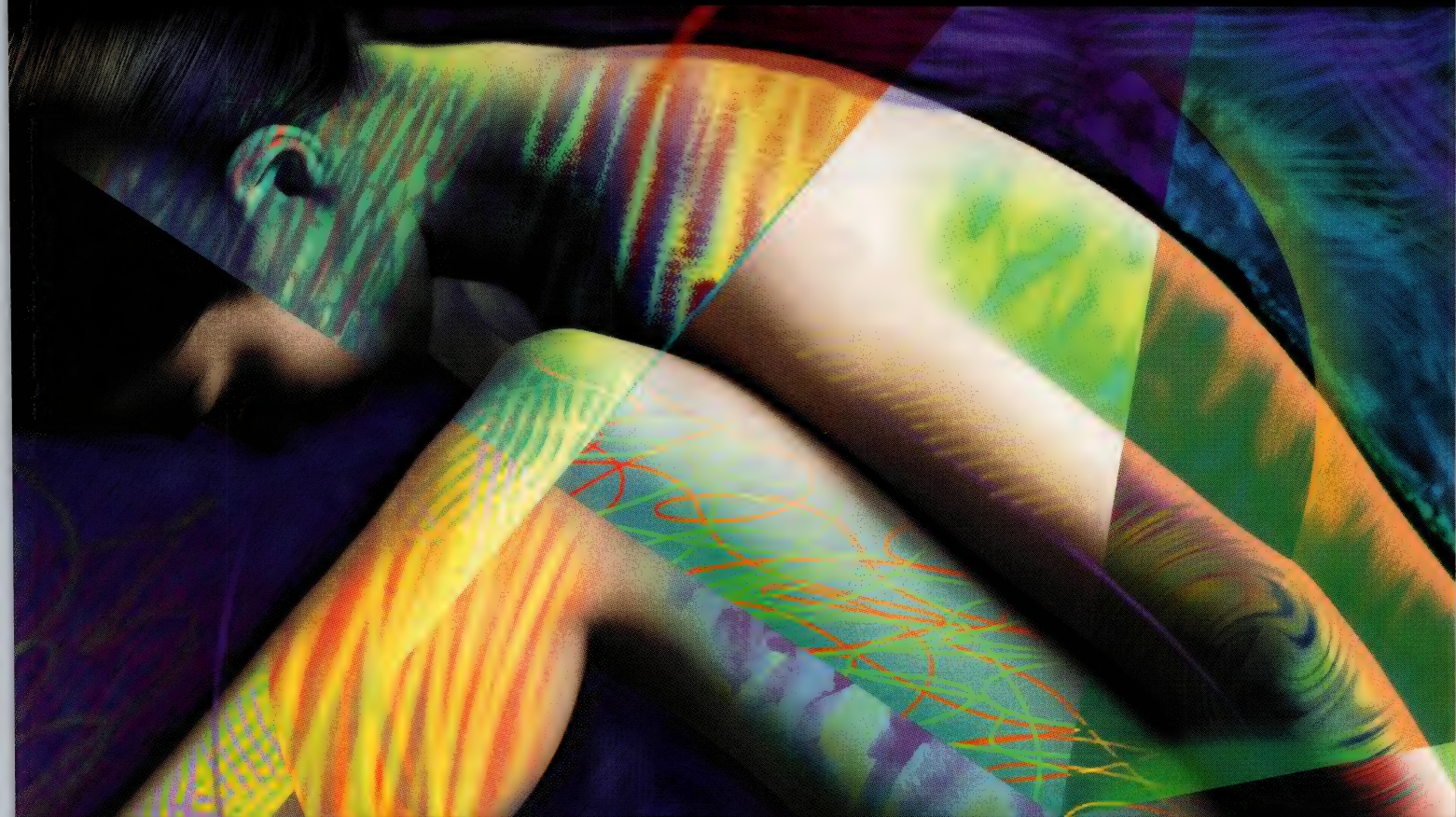
• The US's largest access provider, America Online (AOL), will hit Australia in the next 12 months in the form of AOL Australia, a joint venture between AOL and German media conglomerate Bertelsmann AG. In a 50/50 joint venture set to create 100 jobs, AOL will con-

tribute its technology, brand, content and access to its 9 million-member global consumer base. Bertelsmann will contribute an initial investment of between \$27 million and \$41 million, and its Australian market presence in music and books through its Doubleday Book and Music clubs, which have around 650,000 members.

• Apple Computer Australia has ditched mass market retailers in favour of its own chain of one-stop shop AppleCentres. A

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CROSS-PATENT DEAL ENDS LAWSUITS

Digital and Intel settle

Just days before they were due to appear in court, Digital and Intel announced the settlement of lawsuits concerning allegations of patent infringement in Alpha and Pentium processors.

Under the arrangement announced by the two companies, Digital and Intel will cross-license their patents for a period of 10 years. Digital filed a suit against Intel in May, claiming that its Pentium family of processors violated 10 patents held by Digital in relation to its Alpha technology. Intel subsequently countersued Digital in late May when the company did not return documents relating to Intel's long-term processor plans, and then filed a suit in August claiming that Digital was in violation of 14 Intel patents.

As part of the deal, under which neither company has admitted liability, Intel has agreed to acquire Digital's semiconductor manufacturing operation for \$US700 million. In turn, Intel will serve as the main manufacturer for Digital's Alpha processors.

Financial details of the latter deal were not disclosed, but it is likely to be a significant boon for Digital, since it will now be able to develop the Alpha architecture without bearing the full expense of



building fabrication plants. "We will offer Alpha-based systems as long as our customers need them, but we will do so using a much more efficient business model — one that does not require Digital to make substantial and continuing investments in semiconductor fabrication," Digital chairperson Robert Palmer (pictured) said.

The deal will also ensure a continued supply of Intel processors to Digital for its PC and server business. During the litigation, Intel officials said that Digital's OEM contract for Pentium processors would expire in late September — a claim strenuously denied by Digital.

For its trouble, Intel has an undertaking from Digital that it will develop a range of systems based on Intel's IA-64 processor architecture (known by the codename Merced).

Angus Kidman

DSL SEEKS NEW EXTENSION

1Mbps modem on the way

Although 56Kbps modem services are yet to reach standardisation, Rockwell is already planning a modem to be released next year that will break that 1Mbps barrier.

The organisation, whose K56flex standard is currently competing with 3Com's x2 systems in the marketplace, has released details of its plans for a new high-speed technology, known as Consumer Digital Subscriber Line (CDSL). CDSL will offer access speeds of up to 1Mbps — considerably faster than either 56Kbps or ISDN technologies, but slower than other digital subscriber line technologies such as ADSL (Advanced Digital Subscriber Line), which offers a minimum of 1.5Mbps.

Rockwell has announced few details of the standard, other than that it will run at the lower 1Mbps downstream speed for cost reasons and will not require installation at the user's end, which is currently a problem for other DSL implementations. However, telcos will still need to install CDSL equipment in local exchanges;

the technology has a maximum reach of around 5.5km.

In addition, it will allow concurrent phone and data calls, using proprietary technologies to adjust data rates in response to line impairments or other network problems. "The real breakthrough of CDSL is its ability to operate concurrently with POTS calls and without a splitter," Michael Henderson, marketing director for Rockwell's ADSL technology, said in a statement. CDSL is asynchronous, with a maximum upstream speed of 128Kbps.

One problem for Rockwell is that while it has positioned CDSL as a logical successor to K56flex, the International Telecommunications Union (ITU) has yet to decide on the standard for 56Kbps modems, and is not expected to do so until early next year. The company has predicted that CDSL products could hit the marketplace as early as the second half of next year, but most observers believe that is an optimistic target.

In related news, Telstra has approved DSL technology for general use on its existing copper network.

Angus Kidman



News roundup

joint partnership between Apple and selected resellers, the new Apple-dedicated retail outlets will feature Apple business, home, education and multimedia solutions. There are to be 51 AppleCentres nationwide.

Standards Australia has given a positive vote to Sun Microsystems' plea to become a Publicly Available Standards (PAS) submitter for its Java programming language,

reversing an earlier 'no with comments' decision. At press time, the full complement of 27 member countries of the International Standards Organisation had not all voted on the move, although the US was a notable 'no' vote.

Australian developer Sausage Software has announced plans to develop a pay-per-chat system as an addition to its eVend electronic commerce product. Sausage has formed an alliance with US firm Paralogic to create a new product, eVend ChatSeller.

The product will compete in a market where, for the most part, charging for participation has not been the focus, but embattled CEO Steve Outtrim remains confident there's a market for the system.

For regular updates on what's happening in the world of computing, check out APC's Highlights From The Wire every Monday at <http://apc-mag.com>, as well as our breaking news stories throughout the week.



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BUSINESS BOOMING

IT services in the money

The Australian computing services industry has nearly doubled in size over three years, but the opportunities for making money in it are diminishing, according to figures released by the Australian Bureau of Statistics (ABS).

In a newly released report, *Computing Services Industry, Australia 1995-96*, the ABS said that the number of businesses in the computing services industry stood at 9,679 in June 1996, up from 4,894 in June 1993. However, the operating profit margin for the sector has dropped from 9.3% to 5.7% over the same period.

The number of people employed in IT services has grown rapidly, and now stands at 55,046 employees in total and 27,797 dedicated to computing and technical functions. This is an 87% increase overall on the 1993 figures.

While 88% of companies in the computing services industry employ fewer than five people, those firms account for just 14% of the total \$8.088 billion generated by the sector. **Angus Kidman**

PAYPHONES TO OFFER DIRECTORIES AND EMAIL

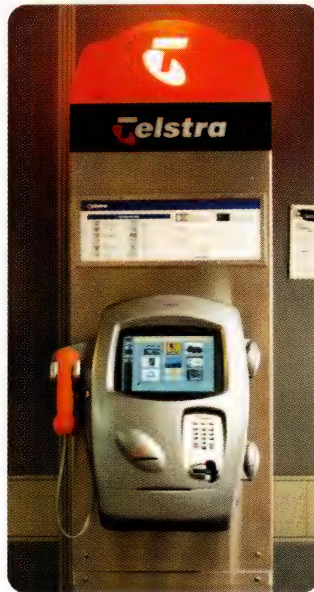
Telstra plots kiosks rollout

Telstra is finalising plans for a rollout of Internet-enhanced kiosk payphones that will include searchable telephone directories, local business information and smart-card access to email accounts.

In February next year, Telstra will begin a limited trial of its 'information kiosks', with 100 to be deployed in selected locations across Australia. The kiosks, which have been under development for the past two years, will be officially launched in the second quarter of 1998, with plans to deploy 10,000 units by 2000.

Unlike previous net kiosks from companies such as World Net and IPAC, the Telstra kiosks will not offer direct Web browsing as such. Instead, they will focus on core information services supplemented by local area business and transport information, said Chris Fendley, Telstra's business development manager for kiosks.

With that end in mind, the kiosks will include a combined smart card/EFTPOS card reader, a printer for outputting receipts and information, and



a colour touch screen for information access, as well as a conventional telephone handset and coin receptacle. Unlike most existing kiosks, there will be no full keyboard; an 'on-screen' keyboard is used when non-numeric input is required.

Standard services on the systems will include access to White Pages and Yellow Pages directories and bill payment. Most of these basic services will be free, although Telstra is

considering a nominal charge for printing out phone and address information, and will take a percentage transaction fee on bill payments.

The commercial clincher for Telstra is the ability for individual businesses to offer services through the phones. Content for such pages will be written in HTML and stored on the kiosk itself, using additional tags to access kiosk-specific features such as auto-matic dialling of telephone numbers and the onscreen keyboard.

Each kiosk is powered by a PC subsystem using a Pentium 100MHz processor, 32M of memory, 2G of hard disk storage and running Windows NT 4.0. The first lineup of kiosks will link into the standard telephone network, but future models may be connected to ISDN or cable links.

Telstra also plans to offer email access from the systems. In the first phase of rollout, it will offer 'temporary' email accounts for tourists and travellers, accessible via a smart card. Further down the track, it plans to offer access to POP3 email from large ISPs.

Angus Kidman

IT'S HOW YOU SEE IT

Web users hooked on book look

Are you a satisfied Internet user? If so, the chances are you visualise the Internet as a gigantic library, according to a Sydney academic.

Dr Harry Bruce, a senior lecturer in the Faculty of Humanities and Social Sciences' Department of Information Studies at the University of Technology, Sydney, recently became the first Aus-

tralian to win the American Society for International Science's top prize — the Doctoral Thesis Award for outstanding achievement by information scientists in the completion of dissertation projects.

His thesis, entitled *A User Oriented View of the Internet as Information Infrastructure*, examined the factors contributing to an "end user's perception of having had a

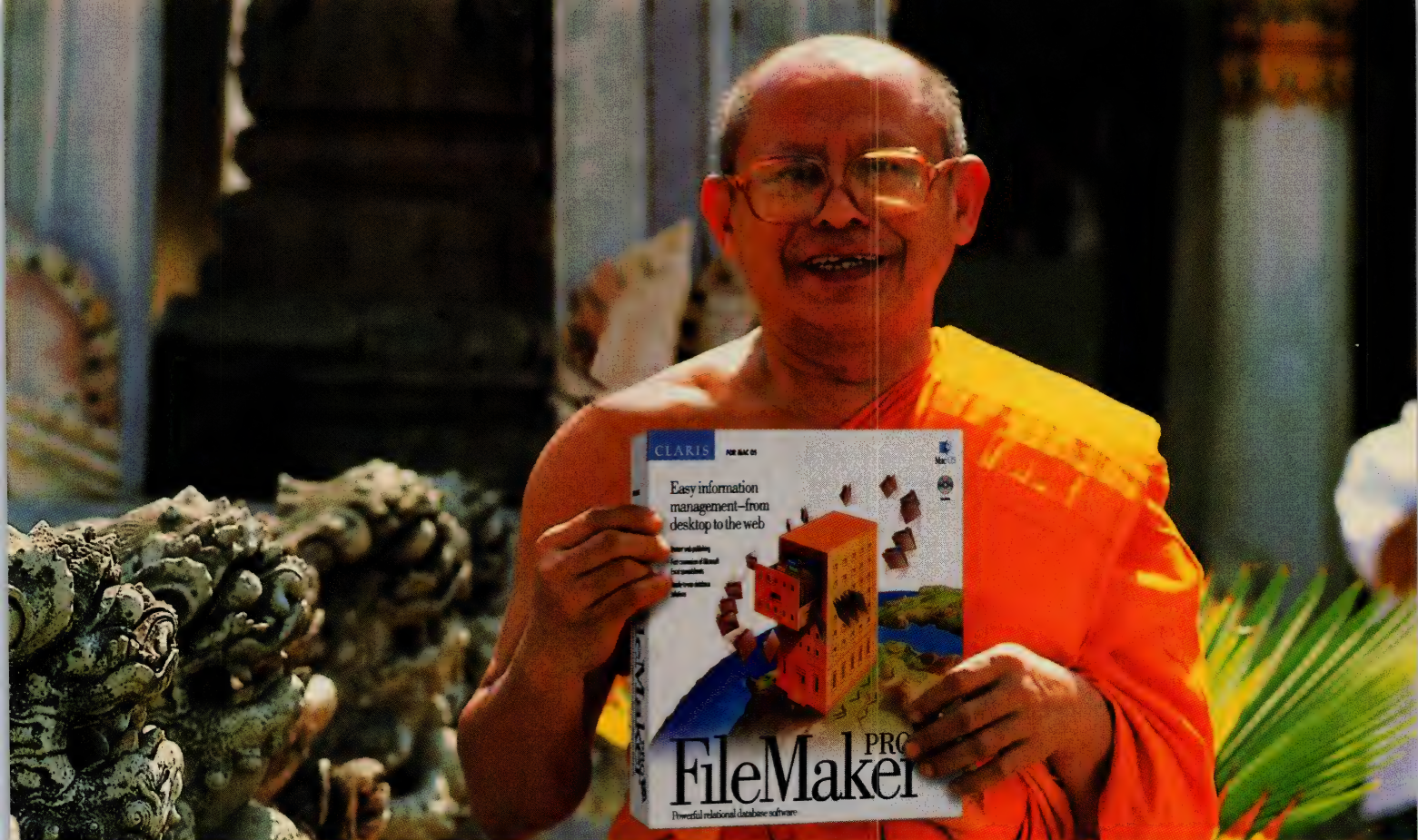
successful or purposeful interaction with the Internet to treat or resolve an information problem".

"In the end, two factors or images influenced the way people perceive their interactions with the Internet," said Bruce. "Either they view the Internet as a communications medium, in which case their perception of success is quite low, or they view it in terms of a library, which leads

to higher levels of satisfaction."

"Because we're familiar with the image of a library, and less easily able to visualise this massive communications infrastructure, those people who think of the Net as a library are going to be more satisfied." While the study was confined to academia, Bruce thinks the conclusions apply equally well to the average Net user.

Josh Gliddon



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INTEL, CYRIX AND AMD LOOK AHEAD

Processor firms plan the chip of 1998

The annual Micro-processor Forum in San Jose in October served as an opportunity for leading developers to outline their plans for the upcoming year, with 'extensions to existing instruction sets' as a common theme.

Intel used the forum to publicly release details of the Explicitly Parallel Instruction Computing (EPIC) architecture which it has developed with Hewlett-Packard. The architecture will form the basis of the 64-bit instruction set architecture (ISA) which Intel plans to use in future processors, beginning with Merced, now scheduled for delivery in 1999. Current Intel processors use a 32-bit ISA.

Intel and HP officials predicted that the new architecture will deliver better performance than current Intel complex instruction set computing (CISC) designs and competing reduced instruction set computing (RISC) implementations. "This next-generation ISA uses predication, speculation and explicit parallelism to overcome the performance constraints of conventional RISC architectures," said Jerry Huck, project manager at HP's Systems Architecture and Design Lab.

AMD announced that next year it will release the K7, the next generation of its current K6 architecture. The K7 will mimic the design of Intel's Pentium II by being mounted in its own 'Slot A' module, which will be compatible with the Slot 1 design used in the Pentium II. However, AMD also intends to continue developing processors based on the existing Socket 7 standard and to extend that standard, AMD CEO Jerry Sanders said.

Sanders predicted that the K7 could reach speeds of more than 500MHz. The company's next scheduled chip release, the K6 Plus, due in 1998, will feature an enhanced instruction set for producing 3D graphics.

Cyrix used the forum to announce details of its next-generation processor, the MXi, which it plans to begin producing in the second half of 1998. The MXi will run on a new architecture, codenamed 'Cayenne'. Cayenne will include a dual-issue, fully pipelined floating point unit. Cyrix officials anticipate that the main benefit will be in generating 3D graphics and complex multimedia images. Processors based on the core will begin production in the second half of 1998.

Angus Kidman

DEMAND OUTSTRIPS SUPPLY

Wanted: IT staff



With the demand for IT staff expected to increase and the number of available staff set to decrease, more enterprises will use outsourcing out of necessity, no matter what the cost, a major research firm has predicted.

By 2001, it is likely that 75% of enterprises will employ selective IT outsourcing as a routine means to increase competitiveness or gain access to new resources or skills, according to Bob Hayward, vice-president of Asia-Pacific services at the Gartner Group.

Hayward said that through 2002, the effective unemployment rate in the IT industry would be substantially negative. For every 10 full-time positions vacant, he said, only seven to 8.5 IT professionals would be available.

For this reason, outsourcing is entering a new phase. "Now we are getting to the phase where even if you try to do what you do best, you may not have the staff to do it," Hayward said.

"Soon we will be able to turn to companies that will be front ends of overseas software factories, so you will see subsidiaries of Indian, Chinese and Philippine companies in Australia that will have people on the ground here that will



work with you to interface with factories of software programmers back in the home countries."

Training is also expensive, but necessary, Hayward told APC. "Clearly this industry needs to do a better job of training people. We are kind of stuck in this rather 19th century 'send everybody off to a classroom for three days' idea. It's been proven that people who attend classes forget more than 50% of what they learned in the first 48 hours and 80% within the first month."

Hayward said the solution was just-in-time training, using icons onscreen to walk staff through tasks. "That technology needs to be embedded in the applications that we build or the applications that we buy, or we have to go out and get it third party."

Selina Mitchell

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Despite community concerns over their effects, violent games guarantee big bucks for developers and retailers alike.

Blood money

Just before the release of the 'road rage' game Carmageddon (which awards players points for the 'creative killing' of pedestrians while driving), its distributor sent out a press release. The document proudly stated the game would go on sale in Australia despite the protests of state government ministers and traffic authorities about its violent and disturbing content. The debate that followed gave the game plenty of free publicity, and sales.

"We got lots of free advertising for Carmageddon because it was so violent," said Hilad distributor David Mendel. "People want to see violence in games, and Carmageddon allowed players to do in a game something they might want to do in real life, but know is wrong."

"Carmageddon is a car racing game. Yes, it runs over pedestrians, but it is not realistic in its approach," he said.

"Whether we like it or not, violence sells games. We have a game called Time Lapse. It's fantastic — a role-playing game with great graphics. We have advertised it, promoted it, it has had great write-ups, but we can't sell it. People want violence."

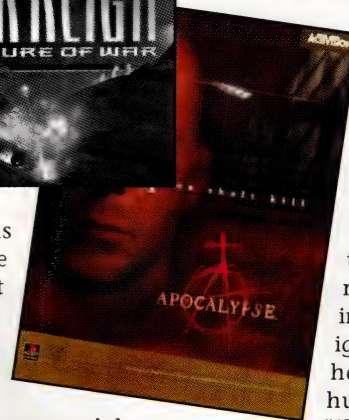
Activision, the distributor of games such as Hexen II and Blood Omen, often distributes press releases for new games to APC. The first sentence of the Hexen II release reads: "Prepare for blood and carnage!" The press release for Blood Omen: Legacy of Kain begins: "Dark, Blood-Soaked Playstation Hit Overflows With Vampire Action, Mystery and Death". A spokesperson said the company did not focus on violence in its advertising.

Michael Van Raay, from Metro Playcorp, an Australian games distributor, said while there certainly was violence in almost any game his company sold, it focused on the theme of a game to sell it. "The people who are into violence already know it is violent." The box the game comes in usually implies violence, as does the name. Take Phantasmagoria 2: A Puzzle of Flesh. Its cover shows a man with his chest torn open.

"Sadly, if there was no violence in games, I don't think we would have the [profitable] industry that we do," said Van Raay.

French-based Ubi Soft Entertainment may be an exception to the rule, or an example worth following. It chooses not to develop or distribute violent games, but still manages to make a healthy profit, with annual worldwide revenues of \$US50 million.

Duke Nukem 3D, a first-person-perspective



shooting game, was released in Australia one month after the Port Arthur massacre in Tasmania. Because of this timing the game's distributor, Manacomm, permanently disabled a password that would allow the game to be more violent. So determined were players to see that violence that they bought in unabridged copies from the US, and others figured out how to reverse the lock and put the violent version on the Net.

Despite this, Ian Mackay of Manacomm said he believed gameplay was what sold games, not violence. "It is more important whether the game is good to play after the first five minutes. Is it a challenge? Does the game get harder as you get smarter?"

Toni Downes, Acting Dean of the Faculty of Education at the University of Western Sydney, Macarthur, agreed that children were not really interested in the violence in games. "They are interested in the challenge, speed, complexity — they know the differences between fantasy and reality. They look at you with world-weary eyes and say, 'It's only a game.'"

Still, many have concerns that violence in games is harmful, and research on the subject is still in its infancy. A review of research into the effects of computer games on children, written by Kevin Durkin, Associate Professor of Psychology at the University of Western Australia, found that there was not much evidence to suggest parents should be concerned by their children playing games. Others argue that most of the research discussed in the review was done in the 1980s, and games have become a lot more interactive, realistic and violent since then.

"You can't go around making bland statements that there is no need to worry about the impacts of computer games," said Nicola Yelland, senior lecturer in Early Childhood Studies at the Queensland University of Technology.

Catharine Lumby, lecturer in Media Studies at Macquarie University, said that children who played games and watched action movies learned lessons in how to distinguish fantasy from reality. The hysteria surrounding the violent content of games ignored the fact that violence has always been a part of human society, said Lumby. "Shakespeare is violent."

"I think it is regrettable that the manufacturers find it attractive to represent violence and aggression as glamorous and heroic," said Professor Durkin. "It would certainly be good to see more evidence of diversity and creativity in games."

Distributors admit that with the focus on violence, they and manufacturers are probably alienating half their potential market — women and girls. "We as an industry haven't done a good enough job of selling game titles that are non-violent, that are mentally satisfying," said Mendel.

With gruesome titles such as Total Annihilation, Redneck Rampage, Blood, and Tomb Raider, computer games thrive on violence and bloodshed. Even games that aren't violent try to jump on the profitable gore wave by creating grisly titles. Perhaps they should try another record?

Selina Mitchell

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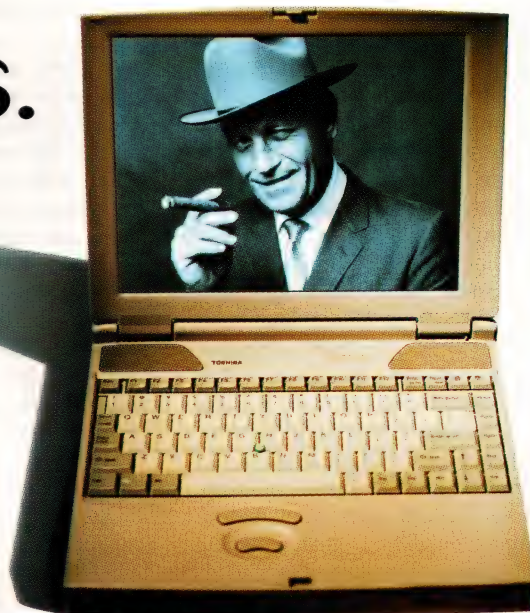
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FRIEND

Windows may be everywhere already — but even that's not always enough for Microsoft.

Windows of opportunity



Microsoft's ambition has often been summed up in two words that form part of its corporate vision: Windows Everywhere. To ram home the point that it sees Windows not only on every desktop but also practically anywhere a microprocessor can be found, the company has taken to including a standard vision of how Windows extends across different market segments in practically every corporate presentation it makes. This road map depicts Windows as a family of products, beginning with Windows CE as an operating system for low-end devices and the Windows terminal, rolling through Windows 95/98 for the mass market, and then heading on through Windows NT Desktop and Server iterations to the outer reaches of the enterprise.

The reality, however, is more like Windows Nearly Everywhere. In the corporate and consumer desktop markets, Windows 95 does have a clear and apparently unbreakable dominance, although Windows 3.1 has proved a tenacious stayer (especially in the corporate scene) and application sales for the 95 platform have only begun to ramp up in the past year. Windows NT is also a strong (although not yet dominant) contender in the server market. On other fronts, however, the hold is less certain.

Although Windows CE 2.0 has been received better than Microsoft's previous offering for handhelds, Windows for Pen Computing, it still doesn't have a large share of the handheld market. In particular, the best-selling handheld unit, the US Robotics Pilot, doesn't use the MS offering. The Windows Terminal has yet to achieve more than vapourware status, while Microsoft remains tight-lipped about its long-term plans for WebTV, which it acquired in April.

And despite its strong position in the desktop and server operating systems market, Microsoft clearly regards any competitive threat in this area very seriously. That is evidenced particularly clearly in its determined stand against recent lawsuits which could undermine its

operating systems strategies (see page 19), but also in a number of its other recent actions.

The phenomenon can be seen particularly clearly in one of Microsoft's most vul-

nerable areas: directory services. Novell's NetWare has featured directory services since Version 4.0 in 1993. In contrast, Microsoft's much-touted Active Directory technology won't appear until NT 5.0, which isn't scheduled to ship until next year at the earliest.

Walking on broken glass

What are the major competitive threats to Microsoft in 1998?

Java: although tarnished, the 'write once, run anywhere' philosophy retains strong corporate appeal

Rhapsody: Apple's next-generation OS recently entered the beta cycle

NDS for NT: Novell's lead in directory services may be hard to break

nerable areas: directory services. Novell's NetWare has featured directory services since Version 4.0 in 1993. In contrast, Microsoft's much-touted Active Directory technology won't appear until NT 5.0, which isn't scheduled to ship until next year at the earliest.

Industry consensus has long been that Microsoft's domain-based administrative services for NT are a far cry from those offered by Novell Directory Services (NDS) (see APC November, page 105). Novell has used this disparity to its advantage in selling to many large accounts, and Microsoft seems especially sensitive to the point.

That became apparent once more in late October, when Novell announced that its port of NDS to NT — effectively combining the applications reach of NT with Novell's superior management — would be released in November.

Although the focus of the NT release of NDS is on integrating networks from the two companies, Novell predicted that the new product might actually help increase IntranetWare's market share. "The fact that NDS is available on NT means customers can use NT where they need to without feeling they need to actively standardise on it," said Novell Australasia's managing director Cliff Smith.

Following the announcement, Microsoft's spin doctors worked overtime to ensure that the company remained visible as a contender in the race to control enterprise directory systems. Barely 24 hours

after Novell's official announcement of NDS for NT, Microsoft issued a press release announcing that the number of applications supporting Microsoft Directory Services had increased from 130 to 550 in the past year. What Microsoft describes as directory services in this context is a mixture of NT 4.0's domain-based administration system and the Active Directory Services Interface (ADSI) API, which Microsoft made available as an NT add-on earlier this year. Microsoft also quoted figures saying that 70% of developers surveyed at its recent Professional Developer Conference planned to develop for the Active Directory.

NT's long-term importance to the company is underlined not just by this kind of hype-directed activity. It also represents a possible escape route for the company in its ongoing battles with the US Justice Department (DOJ) over licensing practices.

According to William Neukom, Microsoft's senior vice-president for law and corporate affairs, the consent decree Microsoft is currently operating under only relates to Windows 3.1, Windows 95 and successor products. It does not affect Windows NT, which is clearly recognised by the DOJ as a separate product, Neukom said.

Microsoft has begun shifting the emphasis of its future operating systems from Windows 95 and its successor, Windows 98, to Windows NT over the past year or so. "NT is at the centre of our R&D and that's a strong message to business to move up to NT for its security and performance strengths," CEO Bill Gates said at the recent Seybold publishing conference. "It will be our primary product." Microsoft is also altering its own compliance programs to ensure that ISVs develop applications for NT.

Internet Explorer, which is at the centre of the current DOJ dispute, is freely available for both platforms. However, under the terms of the current decree, the DOJ could not require Microsoft to change its distribution mechanisms for IE within NT, although it could theoretically seek a separate order doing so.

Angus Kidman

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APFL97

Microsoft Windows NT 5.0

Windows NT 5.0 is Microsoft's most ambitious operating system release in a long time. With NT fast establishing a serious presence in both the server and workstation markets, and eventual plans to replace the 95/98 family with various flavours of NT, the 5.0 release will be crucial to the company's ongoing success.

While NT 4.0 was primarily a GUI upgrade, Microsoft wants NT 5.0 to be a high-volume product, incorporating many of the underlying features of Windows 95 as well as a host of enterprise enhancements. We had a look at Beta 1 of the product, soon after its release to developers.

The desktop

The code base in NT 5.0 has been heavily rewritten to incorporate support for Plug and Play devices. Device drivers written for NT 5.0 will also work with Windows 98 and vice versa as part of the new Windows Driver Model (WDM). The NT kernel uses a virtual device driver to let the WDM drivers talk to NT, thereby keeping the existing legacy support while providing access for these new Plug and Play devices. In addition to this a hardware wizard is now featured in the Control Panel in which most of the common tasks performed by users, such as changing device parameters, are scripted, making it easier to control the system's hardware configuration.

NT Workstation uses an upgrade manager when the user wants to shift from Windows 95 to NT 5.0. This upgrade manager looks at all of the applications on your hard drive and provides comments on what will happen to them after the upgrade.

For the energy conscious, PCs with the Advanced Configuration and Power Interface (ACPI) will be able to fully exploit its features. NT 5.0 also supports OnNow, which is part of the ACPI standard. OnNow is an initiative from Microsoft, Intel and Toshiba whereby PCs go into a standby mode (like a

TV or VCR) when turned off. When they are called into action they can start operation immediately, instead of having to wait for the computer to boot and load the operating system.

NT 5.0 will have the latest version of Microsoft's DirectX technologies when it ships. The beta examined by APC had an implementation

be viewed and accessed from within a single virtual directory. In addition, finding NT network resources has been improved. If you have Active Directory (part of NT Server 5.0) running, then printers and shared network storage will be searchable. Microsoft has also overhauled the NT back-up program to dramatically increase the number of back-up devices it supports.

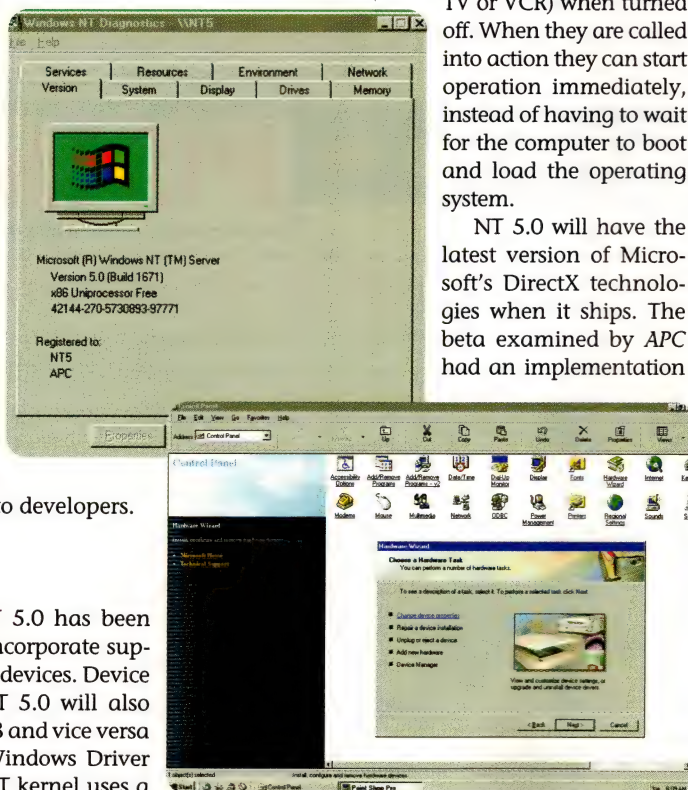
Incorporating a superset of Windows 95, and using Internet Explorer 4.0, NT 5.0 benefits from all the Internet functionality enjoyed by users of Windows 95 and 98. This includes all the enhancement to the GUI such as a single unified Explorer and Web view, which presents the contents of your folders in a Web-like format. Also included are the Taskbar single-click launching icons and Web tasks on the Start menu. As well, IE4 implements dynamic HTML which will let users view dynamic styles and content and also use x-y-z positioning within Web pages. Outlook Express, Personal Web Server, NetShow, Web Publishing Wizard and FrontPage Express are all bundled with NT 5.0.

Last but not least, this new version of NT caters for disabled users, with an Accessibility Configuration Wizard and a screen magnifier for users with impaired vision.

Served heads

NT Server 5.0 represents a major upgrade over previous versions. The biggest enhancement is the inclusion of Microsoft's new directory service, called Active Directory. Active Directory uses the Lightweight Directory Access Protocol (LDAP) as its base protocol. It is definitely a step up from the archaic directory service users have had to endure in previous versions of NT.

The Active Directory structure is not a full implementation of the X.500 information model. Microsoft's official line on this is that it has used the best features of X.500 without the heavy overheads associated with unneeded data. Underlying the Active Directory structure is the Internet Directory Name Space (DNS), which is used to find objects on the network. Gone



of DirectX 5.0, which means that NT 5.0 users will be able to play all DirectX-enabled games and receive full hardware acceleration from their 3D graphics accelerator. Developers will also be able to take advantage of the DirectX interface and write multimedia applications for both Windows 95/98 and NT 5.0. By comparison, NT 4.0's Direct 3D implementation used a software emulation driver, which was not as fast as the hardware acceleration drivers found in Windows 95.

Browsing network resources has been improved in NT 5.0 with support for Distributed File Systems (DFS). Many different file shares and network resources can

are the days of needing Primary and Backup Domain Controllers. In Active Directory there are only Directory Controllers (DCs).

Windows NT 3.x and 4.0 directory services will be emulated to enable NT 5.0 clients to see older NT servers. On the flip side, an Active Directory server that is installed in a NT 4.0 domain will appear as an NT 4.0 domain controller.

Migration to NT 5.0 from older versions of NT involves a process of upgrading the primary domain controller, followed by the backup domain controller. Until they are upgraded, older NT clients and servers will still be able to see these new servers as NT 4.0 systems.

Network administrators who want to move their NetWare servers to NT have more sophisticated tools in NT 5.0 than earlier versions. A new utility moves both bindery services and NDS directories to the NT 5.0 Active Directory.

NT 5.0 uses a file system known as NTFS 5.0. The Beta 1 version of NTFS we tested can't be recognised by older NT 4.0 and 3.x servers. If you want your system to remain compatible, you can still use NTFS 4.0. NTFS 5.0 comes with a number of enhanced features, such as disk quotas: when a user's disk space quota is reached, the operating system can automatically launch an event (such as a notification to the user).

Scripting capabilities for system automation are also supported in this new version of NT Server. Version 5.0 hosts direct script execution from the command line via the Windows Scripting Host (WSH). All you have to do is type the script from any command line and away it goes. The WSH will understand both Java and Visual Basic scripts natively. Other manufacturers will be able to build ActiveX controls to interface their scripts into the WSH. Alternatively, double-clicking on a JS or VBS file in Windows will automatically execute the script.

Addressing the concerns of the ultra security conscious, NT 5.0 implements an Encrypting File System (EFS). The EFS uses public key encryption and works together with Microsoft's CryptoAPI architecture for writing secure applications. All of the files on an EFS-enabled system are encrypted with a public key that is not

related to a user's public/private key pair. The EFS can be configured on a per-file or per-directory basis and requires little administration. The files remain encrypted on the disk but are transparently decrypted when called for use.

Furthermore, NT 5.0 uses the Kerberos Version 5 authentication protocol as defined in the Internet RFC 1510 document. In NT

5.0, the Kerberos authentication protocol uses public and private key authentication with the NT Access Control List. Within Active Directory, if a user does not have Kerberos

Network Addressing Feature. If a LAN adapter within an NT computer is set to find an IP address automatically, it will look for a Dynamic Host Configuration Protocol (DHCP) server for the address. If it can't find a DHCP server, then the Automatic Addressing feature kicks in, automatically assigning an IP address to the machine and then testing the network to see if any other computers have the same address.

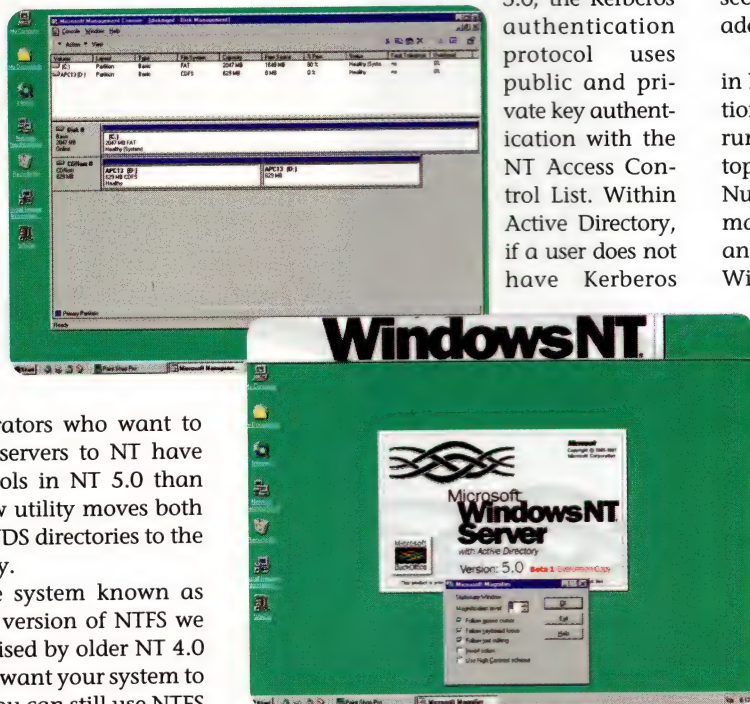
Microsoft has beefed up ATM support in NT 5.0, providing an ATM LAN Emulation client to assist existing applications running on Ethernet, or other network topologies to work with an ATM network. Numerous other improvements have been made, including direct TCP/IP over ATM and the integration of ATM support into Winsock Version 2 and 32-bit TAPI applications to manage virtual circuits over an ATM network.

Remote access has come under the microscope with NT 5.0. The Bandwidth Allocation Protocol (BAP) will provide administrators with the ability to manage traffic flow between remote users. This was designed for ISPs and other entities that charge by volume.

One of the most touted features of Microsoft's latest generation of operating systems is the support for emerging technologies such as USB and AGP. NT 5.0 will eventually feature full USB connectivity, including chaining as well as automatic notification of a new device placed on the bus. AGP and FireWire devices will also be fully supported and recognised.

All up, NT 5.0 is a strong upgrade that brings the best of Windows NT together with the best of Windows 95, and also has a whole bunch of new features thrown in. Microsoft has already conquered the desktop space, and NT 5.0 is certainly a step towards achieving the same with the NOS space.

Lachlan Botticchio



certification, a remote user can gain an X.509 v3 public key from a trusted supplier to gain access to the NT Networks resources. Microsoft's certificate server is one product that will issue such certificates. The NT network can be changed from any of the domain controllers within NT 5.0 due to the use of multimaster replication.

All of the administration functions found within NT 5.0 are located in the Microsoft Management Console (MMC). The MMC is a central container that hosts all of the variables of system management. The MMC itself is extensible via plug-ins that can be written by any third-party ISV.

One of the snap-ins to the Management Console for Windows NT 5.0 is the Security Configuration Editor. This is designed to provide enterprise-level administration features for an NT network's security. Many common security functions and batch processing can be performed from the Security Configuration Editor, saving administration time.

Another new feature of NT 5.0 that is good for small LANs is the Automatic IP

Microsoft Windows NT 5.0

■ Distributor	Microsoft
■ Phone	1800 686 400
■ Online	http://www.microsoft.com.au
■ Price	Not available
■ In short	Microsoft's ambitious new operating system combines all of the features of Windows 95 with many enhancements to the server end.

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STANDARD DEPTH



The DeluxScan 15G+ was the top-rated 15-inch monitor in the March 1997 issue of German computer magazine CHIP.



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DeluxScan monitors support refresh rates up to 85 Hz*, the latest VESA standard, for a flicker-free picture users' eyes will appreciate all day long.

3-Year Warranty

Hyundai stands behind its products. That's why DeluxScan monitors are covered by a 3-year-limited** warranty through an expanding worldwide service network.

*USB hub is being added to all DeluxScan models. **Plug-and-Play requires DDC 1/2B compatible graphic card or USB compatible devices. *Actual scan rate depends on graphic card and selected resolution. **CRT, parts, and labor only. See product literature for complete details. All trademarks are property of their respective owners.

HYUNDAI
DeluxScan Monitors

This year's iteration of Corel's drawing program introduces a new look.

CorelDRAW 8

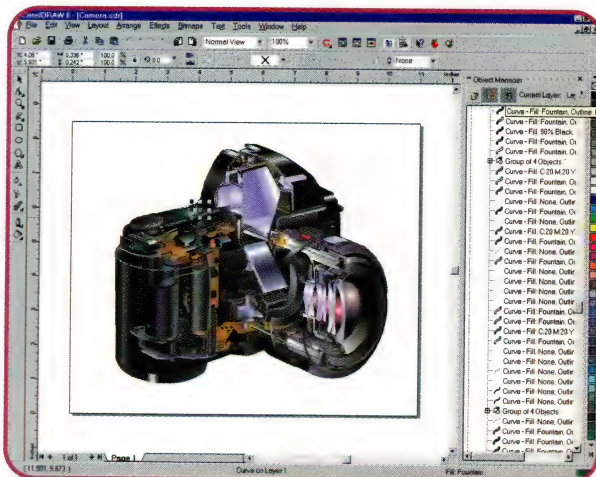
New versions of CorelDRAW are becoming a seasonal fixture: as soon as surf reports start reappearing on the news and the shops begin to fill with Christmas junk, you know a new version of CorelDRAW can't be far away. Sure enough, we received the late-arriving beta of CorelDRAW 8 in October. The final version should be about to ship, and on past experience that means the first maintenance release is already under way. Sorry to be cynical, but Corel's determination to ship a new version of its flagship product every year usually means that there are a few bugs in the first shipping version. Corel is far from unique in having this problem, but it does seem to make things worse by keeping up this relentless release schedule.

Corel's annual update program must also be a nightmare for its developers, who have to think up new features within a few weeks of finishing the previous version. Perhaps that's why Version 8 is a little short on the 'Wow!' features which made earlier releases so stunning.

Lots of fairly minor polishing has been done to the interface, which Corel boasts has a new 'flat look' (it seems only yesterday that every manufacturer was boasting how their latest release had an exciting new '3D look'). The new look is similar to the one being used by the current versions of the market-leading Web browsers: flat buttons that 'pop out' as the mouse moves over them. Effort has also gone into making CorelDRAW's rather mind-numbing array of features and tools easier to use. The new version continues the trend begun in Version 7 of making most of the tools interactive, so that blends, fills and transparency can all be created by simply dragging. A new addition to these interactive tools is the drop shadow tool, which allows realistic, soft, transparent shadows to be created by clicking and dragging.

Other improved tools include interactive versions of the envelope and 3D extrusion tools, and a new free transform tool, which allows standard effects such as skewing to be applied interactively. There's also a new distortion tool, which allows shapes to be twirled and twisted — the kind of thing that's fun to play with, but seldom seems to be of any use.

Much more useful are the improvements to the basic drawing and selection tools. CorelDRAW's rivals — Adobe Illustrator and Macromedia FreeHand — force you to change tools to select, scale or rotate an object. CorelDRAW has always combined these functions in one tool but now you can also edit curve nodes without changing tools — just click



on the node and move it. You can also select and move a newly-drawn shape without changing tools by clicking the cross-hair which now appears in the centre of each object. Another handy addition to the selection tool is something Corel calls 'digger selection'; by holding down the Alt key when you select, you can 'dig down' to select objects which are behind others.

As one would expect in this Internet-obsessed age, there are several improvements to CorelDRAW's Web support, including the ability to export a complete layout as a Web page. There's a new 'Make HTML Compatible' wizard that will check your artwork for features that won't work on a Web page, and also offer you a variety of options, such as creating frames and tables. Another simple but useful feature is that custom page sizes can now be as small as 16 by 16 pixels, which is ideal for designing Web interface elements.

Internet bookmarks can be added to CorelDRAW graphics in order to create image maps, and these are managed using another new interface feature called 'dockers'. These oddly-named features are

palettes which 'dock' along the side of the screen. They can be folded away, so that only their name appears, but click on their name and they pop out, ready for use. As well as bookmarks, clip art, scripts, the object manager and several other features are accessible in this way.

There are also new text features, including keyboard shortcuts for enlarging or reducing the point size. A simple but well-designed improvement is that if you pause for a second while typing text, CorelDRAW will display the object selection handles, so you can move or scale the text without changing tools — once you've repositioned the text, you just carry on typing.

There are no major new programs in the Corel suite this time, but the main ones — such as PhotoPaint — have been given the same sort of tweaking and polishing that CorelDRAW itself has received. Particular attention has been given to making the interfaces, menus and shortcuts similar to CorelDRAW, to make it easier for users to switch from one to the other.

Overall, this is a solid-looking upgrade to what was already a very impressive program. It lacks the dazzling new features which made previous upgrades so impressive, but that's because it already had so many market-leading features. There are some very good enhancements, but perhaps not enough to justify the rather high upgrade price.

Jim Endersby

CorelDRAW 8

■ Distributor	OnTarget Group
■ Phone	1800 658 850
■ Online	http://www.corel.com.au
■ Price	\$899; upgrade \$419
■ In short	There are enough solid enhancements to make this a worthwhile — if rather expensive — upgrade.

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Dynalink MODEMS

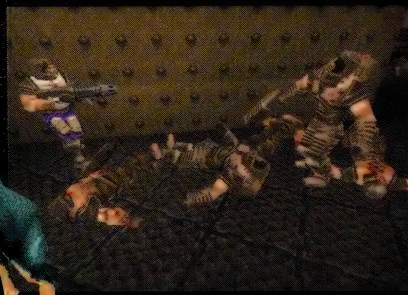
Quake System Requirements:

IBM PC and compatibles. Pentium processor **HIGHLY** recommended, 486DX4/100 minimally required. VGA compatible display or better. 8MB RAM minimum, 16MB recommended (16MB required for running under Win95). CD-Rom drive required. MS-DOS 5.0 or better or Windows 95 (does not run under Windows NT). Hard drive space: 80MB.

IMPORTANT: Quake requires a floating point processor. Systems that do not have an FPU installed will not run Quake at all! **PARENTAL WARNING:** Quake contains a high level of animated violence.



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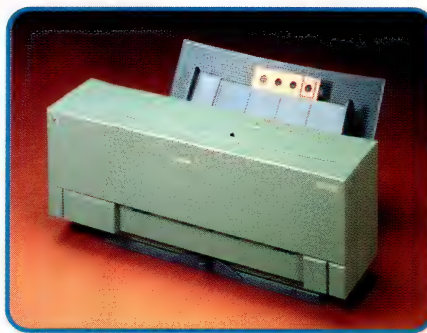


Alps MD-1000

Although the Alps MD-1000 is a photorealistic printer, it doesn't use inkjet technology. Instead it uses a special transfer ribbon like early dot matrix ribbon printers. But instead of 75dpi from a linen ribbon, it manages a very creditable 600dpi using a thermal 'deposit on silicon' microtape, and, the makers claim, up to 1,200dpi on photo-quality paper.

The printer uses a fairly complex print process which involves swapping four tape cassettes. The usual CYMK basics come with the printer, although other colours are available, including white and metallic colours — these can actually be swapped mid-print, and up to four colour ribbons can be installed at one time.

The printer retracts the paper after each colour pass and rewinds the colour ribbons as they are used, which makes the printer quite noisy. But given this multi-pass print system, the registration is astounding. Not a pixel was out of place on any of our test samples. There were a few glitches, however. On a couple of occasions the printer grabbed more than one sheet and thoroughly confused itself as to paper size. One of the ribbons decided to stick fast to a sheet of high-gloss paper, and as a result became wound around the printer innards and



back into the wrong cartridge. The resulting spaghetti of ribbon took a lot of swearing to untangle and re-spool. Hopefully, this was a freak occurrence.

The quality of print output is regulated by both paper selection and printer setup. The supplied driver software is comprehensive and simple, allowing everything from straight black text on a white background on OHP film or cardboard, right through to full photo quality on glossy paper. The supplied applications for T-shirt and image production are, however, very basic. An extra clear film overlay can also be applied for special photo prints. The quality output on glossy paper (specially coated paper is not necessary) is most impressive, if not quite up to the standard of the best inkjets.

More importantly, it is almost as good on standard copier paper. Some flecking is visible, but compared to inkjet, it is way ahead. The running cost is claimed to be less than 50% of that of photorealistic inkjets. The ribbons only cost \$12 each, and you don't have to throw them all away when one of them runs out. This efficiency, together with the laser-quality text output, makes the MD-1000 look pretty good as an all-round choice. Let-downs are the speed (up to nine minutes for a gloss-overlaid 1,200dpi print) and the noise. However, it is a welcome departure from 'photo-capable only' inkjets in terms of running costs and quality.

Jeremy Torr

Alps MD-1000

Distributor	Star Micronics
Phone	(02) 9748 4300
Online	http://www.alpsusa.com
Price	\$749; cartridges \$12 each
In short	Surprisingly good quality on everyday materials. If the mechanics bear up, a very viable alternative to inkjets as well as lasers.

Symantec pcANYWHERE32 8.0

The latest version of Symantec's market-dominant remote control application, pcANYWHERE32 Version 8.0, offers enhancements in security and NT integration, and slight improvements in reliability, speed and stability.

Perhaps the most important enhancement is support for Microsoft's CryptoAPI, which expands the product's encryption potential far beyond that of Version 7.5. Users can now bypass Symantec's proprietary encryption for third-party encryption and authentication drivers up to 128-bit.

The current release is the first to integrate closely with NT, catching up with competitors such as Traveling Software's LapLink. Administrators can now use the NT user and group security for caller rights, enabling higher levels of authentication and control and avoiding separate password tables. The host software can be installed as a service, which is recommended for optimal performance — making the NT host available with a single

login. In addition, NT disconnect options are supported, NT hosts can print to the remote viewer's printer, just as Windows 95 hosts can, and pcANYWHERE32 events can be viewed in the NT Event Viewer.

pcANYWHERE32's renowned ease of use is continued with a virtually unchanged interface and the ability to create host connections in a simple, Wizard-driven procedure. The previous version of the product suffered from reliability and speed problems in the areas of telephony, session control and video. We tested pcANYWHERE32 8.0 over a 10Mbps Ethernet network using TCP/IP and using 28.8Kbps V.34 modems, between a 120MHz Pentium notebook running Windows 95 and a Pentium 133MHz server running Windows NT 4.0. APC's testing found no obvious telephony problems. As for speed, remote control across the network was acceptable — noticeably slower than sitting at the host machine, but not unbearable. Graphics redraws have been improved from the previous version, so that once you turn on video-compatibility mode, redraws are fairly smooth.

Unlike Version 7.5, this release allows you to switch between voice and remote control sessions over a single phone call.

A new feature is IP multicast capability, which allows multiple simultaneous connections to a single host for training or presenting to a group.

Dominique Jackson

Symantec pcANYWHERE32 8.0

Distributor	Symantec
Phone	(02) 9850 1000
Online	http://www.symantec.com/pca/
Price	\$239; upgrade \$129
In short	Version 8.0 maintains pcANYWHERE32's standing as a leading remote connectivity product, but only has real benefits for NT users or others needing added security.



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AV76c/97 APC

A useful, if controversial, tool for diagnosing problems with your Internet connection.

VitalSigns Net.Medic



One of the most frustrating aspects of Web surfing is the end user's lack of knowledge and control over the performance of the Internet. Whether it's a dropped connection, or a page that is taking too long to download, there is little information available about the source of the delay. Net.Medic, from Silicon Valley startup VitalSigns, attempts to elevate users from this void and give them more control over their online experience. Using Net.Medic, users can diagnose, and even fix, some of the problems associated with the World Wide Web.

Net.Medic provides information about the various components of the Web, and empowers the end user with the ability to pinpoint performance bottlenecks. Net.Medic makes it possible to discover whether it is the modem, ISP, Internet backbone or the server on the other end that is responsible for poor performance.

Net.Medic can operate as either a single gauge on your browser, or as a separate 'dashboard' to provide more comprehensive information. The dashboard is comprised of up to 11 different 'panes', each of which can be snapped onto the browser, or removed to float on top of the desktop. The software includes the following panes: ticker tape, activity, throughput, retrieval, client, modem, intranet, ISP, Internet, server and connect time.

Each of the panes uses stylish graphical displays to convey information about specific aspects of the network. Most of Net.Medic's displays are given as percentages of potential performance for the respective device. For example, the throughput pane reports the rate of data transfer across the network. The bar graphs display the current throughput as a percentage of the maximum available bandwidth of the connection.

Every aspect of data transfers is accounted for, including modem speed, intranet traffic, ISP load, Internet backbone traffic, and server load. For information local to the computer, the activity pane lists the number of hops a document travels to reach the browser, while the throughput pane lists the total kilobits per second achieved in the download. The retrieval pane also includes two bar

graphs that show the distribution of the delay between the site being accessed, and the network delay between the site and the browser. The client pane also displays the percentage of cached hits to total hits, as well as monitoring the CPU load. Information on the modem's performance is displayed as well, including the

AutoCure button that will fix the problem automatically.

While Net.Medic's ability to 'AutoCure' Internet-related problems sounds appealing, the majority of problems affecting the Internet are beyond the scope of software alone. With a dial-up connection, download time will necessarily be limited by the

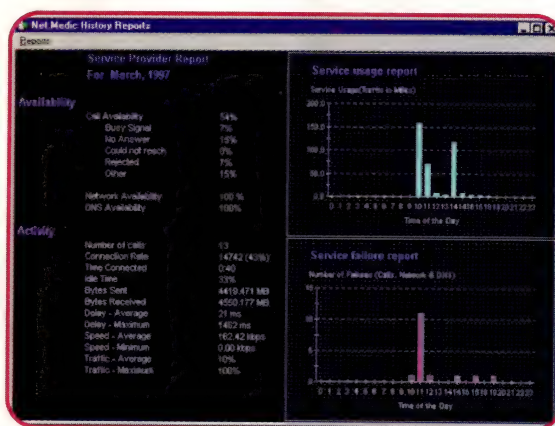
available bandwidth of the modem. Beyond that, the problems of scale associated with the Internet, such as size and complexity, are also well beyond the ability of a utility program to fix. The most frequently reported prescription from Net.Medic is to try back later when there is less Internet traffic, an option that is often as frustrating as waiting for the page to download.

One of the more controversial features of Net.Medic is the Notify button, which formats an email to either a Webmaster

or your ISP outlining their performance problems. While this has been changed from Version 1.0, where selecting the default option during installation automatically sent emails to offending service providers, many vociferous ISPs have aired their discontent with the notify feature. ISPs claim that more often than not, Net.Medic's findings are inaccurate, and increase their workload unnecessarily. Indeed, Net.Medic's own disclaimers state that the product's findings are estimated, and are not 100% accurate.

However, despite claims of inaccuracy, Net.Medic provides a wealth of information about Internet performance.

Travis Simon



amount of compression employed and the percentage of the maximum bandwidth achieved.

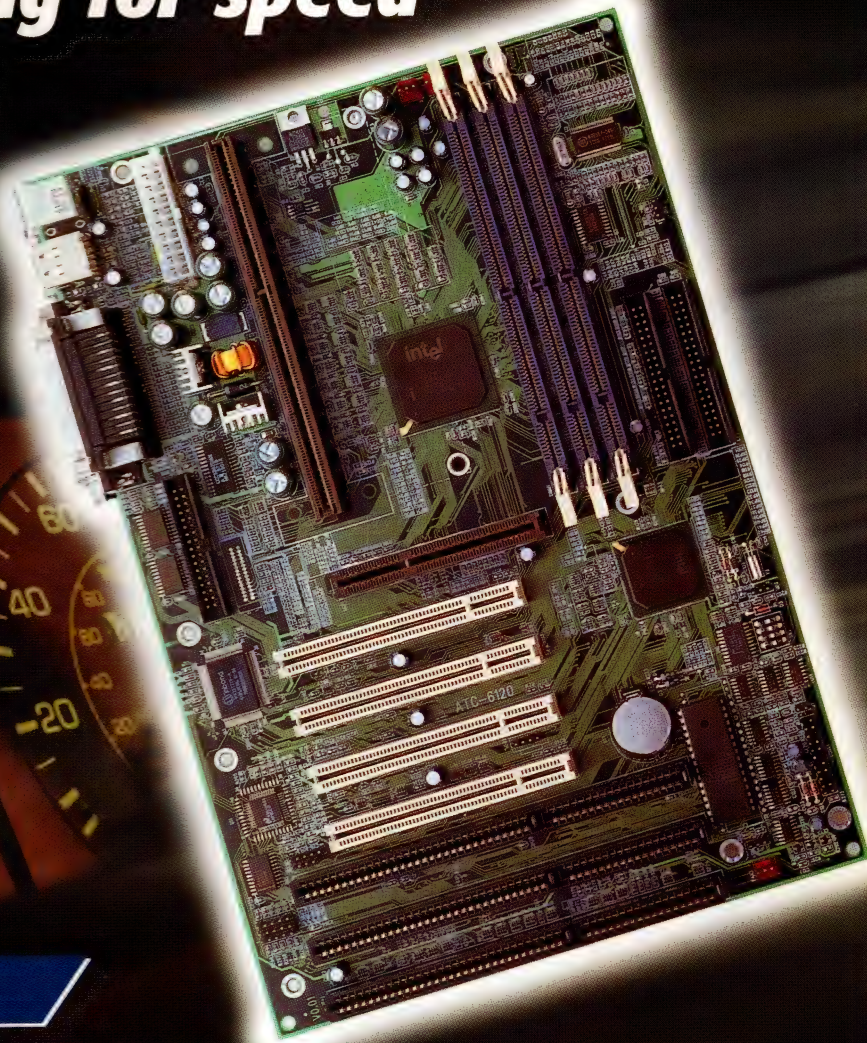
Moving beyond the desktop, Net.Medic monitors the amount of network traffic on an intranet, and interestingly, the amount of traffic at the local ISP. Information on latency caused by Internet traffic is also displayed. Delays caused by the server on the other end of the network, including its estimated load, are reported in the server pane. Finally, Net.Medic monitors the total amount of time spent online. Current session time, and the amount of online time spent for both the current day and month are all reported.

Although session monitoring is useful on its own, Net.Medic also logs online activity for later analysis. Net.Medic's reports include a health summary report, service provider report, frequently visited site report and a traffic report. In addition, if there is a problem with the current session, Net.Medic will notify you of the problem by changing the icon to either a glowing yellow colour or red for severe problems. Double-clicking on the icon will bring up a diagnostic page offering information about the problem, and a prescription for rectifying it. If the problem is local, Net.Medic also includes a useful

VitalSigns Net.Medic

- **Distributor** LAN Systems
- **Phone** (02) 9901 3655
- **Price** \$120
- **Online** <http://www.vitalsigns.com>
- **In short** Net.Medic is an excellent tool for diagnosing Internet-related problems, although there may be little you can do to remedy them.

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A powerful, if rather expensive, tool for managing a project from start to finish.

Microsoft Project 98

It takes planning and organisation to complete a project on time and on budget. Minor projects can be managed from memory, but bigger projects require more formal organisation. Constructing a bridge or an office tower, developing a new product for market, or arranging a conference or a wedding are typical examples of situations where there are many tasks to be done, many resources and people involved, and deadlines to be met. Project management software makes it easier

The default view is a Gantt chart with two panes. On the left-hand side is a list of tasks, and on the right-hand side is a chart with horizontal bars that display the start, end and duration of each task. To enter a task, just type its name, duration and start date into the task list. As these details are

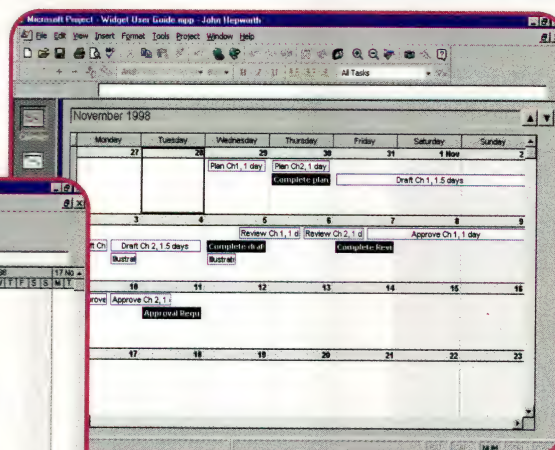
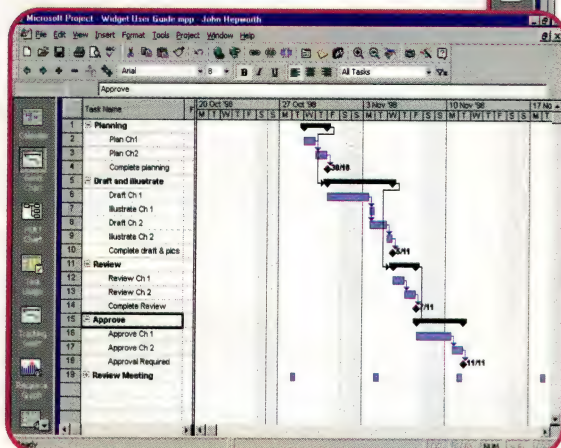
percentage of a resource to reflect a portion used for part of the time each day. Scheduling defaults to the effort it takes to complete a given task, so that changing the resources allocated to a task affects the time allocated. It's also possible to schedule by absolute duration rather than by effort. The new resource contouring feature can define a resource as unavailable on some days, 100% available on others, and partly available at other times.

If resources are under-utilised or overcommitted, Project 98's resource levelling function can be selected to automatically move, lengthen or shorten tasks to achieve the optimum outcome. Resource levelling ensures that, as far as possible, the total time for the project is minimised, while at the same time resources are allocated as effectively as possible.

As in Microsoft's Office 97 suite, Project 98 has great online help, including Office Assistant and normal Windows online help, plus a variety of tutorials. IntelliSense is included, so that Project 98 watches the user and prompts with a better way to carry out an activity if a less-than-optimal action is repeated several times. Communication between team members is greatly enhanced, while some new file formats include the ability to output HTML files for display on an intranet or the Internet.

Microsoft has built Project 98 on the sound base of the previous versions. There are many new and enhanced features, while usability is also greatly improved.

John Hepworth



entered, a bar appears in the chart area on the right, showing the duration of the task in days and fractions of a day. One of the many new features of this version is the ability to split a task over several different time periods.

Tasks can have sub-tasks, and the task list can be collapsed or expanded to hide or display them.

After tasks have been entered, you can turn them into a project by linking them. Linking can be done in two ways — by dragging and dropping from one task to another in the Gantt chart, or by selecting two tasks in the task list, and clicking on the link button in the toolbar. Links default to finish-to-start (the second task starts as soon as the first one finishes), though there are several other types of links including start-to-start, finish-to-finish, and start-to-finish. Links can also have a built-in user-defined delay, in hours or days, to further refine the project schedule.

Adding resources to tasks is the next step. Project 98 is able to nominate individual people, groups with common skills, and other resources. Resources can be added as 100% of the resource for the entire duration of the task, or as a per-


centage of a resource to reflect a portion used for part of the time each day. Scheduling defaults to the effort it takes to complete a given task, so that changing the resources allocated to a task affects the time allocated. It's also possible to schedule by absolute duration rather than by effort. The new resource contouring feature can define a resource as unavailable on some days, 100% available on others, and partly available at other times.

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Microsoft Project 98

Distributor	Microsoft
Phone	(02) 9870 2200
Online	http://www.microsoft.com/project
Price	\$799
In short	Microsoft Project 98 is a powerful project management program for novices and experts.



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Nikon Coolpix 300



Welcome to the world of the PIA (personal imaging assistant). Nikon has, with one leap, crossed new boundaries in several directions with its new Coolpix 300. This wallet-sized gadget offers the ability to cope with scribbled images, moving pictures, text and sounds — all in one hit.

Using the same format as the Coolpix 100 digital camera, the 300 offers a new built-in colour LCD display screen — one that doubles as a touch-sensitive input device. The 300 is supplied with its own stylus, which can be used to set up menus, enter diagrams or annotate existing images captured via the fixed-focus 35mm f4 lens. There is also a tiny microphone nestled in the top of the case, which can pick up either direct dictation, or capture sound and images at the same time.

Up to 17 minutes of sound or 132 images of reasonable quality, 640 by 480 resolution can be stored in the 4M of internal RAM. Any gadget is only good if it is usable, and in reality the Coolpix can be a bit of a handful. Powering on is simple,

just a switch. Using the viewfinder and taking a shot is easy too. Just press the button. The auto-focus and auto-flash do their job, and a reasonable image is captured; but playback is a fiddly exercise. The user needs to extricate the stylus, tap Menu on the touchscreen display, wait for some incredibly tiny thumbnails to appear, select which ones to view (again with the stylus), then tap the Enter icon. Although this approach makes sense thanks to the unit's ability to combine annotations and sounds with images, it does make things very laborious. Additionally, options like flash mode, audio mode and sketch colour selection all demand that you spend extra time tapping and selecting via the touchscreen and stylus.

So, although this is the digital camera that can do everything, you are quite likely to miss the moment through fiddling with the onscreen controls. Pluses include a good software download utility, a fast SCSI interface in addition to the usual serial port, slide-show preparation

for TV use, and the ability to be used as a video camera for videoconferencing links at up to 30 frames per second. The Coolpix 300 breaks new ground. As a useful tool, however, it might get shelved alongside the infamous Microsoft Bob interface. It certainly has all the capabilities and functions — but they are not easy to use. As an alternative, for just under \$1,300 you could buy both a digital camera that offers higher quality, and a memo taker, which together would do virtually the same job.

Jeremy Torr

Nikon Coolpix 300

■ Distributor	Maxwell
■ Phone	(02) 9390 0200
■ Online	http://www.nikonusa.com
■ Price	\$1,289
■ In short	Innovative technology in a neat package, but the user interface is a let-down.

Venture NovaStation



Eventually, escalating demands for processor power and memory will drive most users of older PCs to upgrade their systems. This doesn't mean, however, that all the attachments to those systems will be thrown out as well; peripherals which are still in working order, from modems to monitors, may be transferred directly to the new machine, thereby saving money, if not effort. Soundcards are one of the most common choices for 'recycling' in this manner, but this can result in a system which has oodles of memory, a new operating system and lots of disk capacity — and a sound system which is stuck somewhere in the early 1990s.

NovaStation aims to fill this gap in the market, providing owners of older 16-bit soundcards with wavetable playback without the need for a hardware upgrade. The product (from Singapore's Venture Manufacturing) is not the only one in this market; Roland, for instance, has a similar product, the VSC-550W (see APC December 1996, page 38).

NovaStation's two distinguishing features are its ability to take advantage of Intel's extended MMX instruction set on processors which support it, and its support for the extended GX MIDI format

which Microsoft is promoting as part of its DirectSound API.

Supplied on a single CD and running only under Windows 95, NovaStation is straightforward to install and will happily coexist with other software synthesisers on a system. The main visible application included on the disc is a basic MIDI player, which allows you to assemble playlists of your favourite tracks and then play them back.

Provided that you have set the NovaStation as your default for MIDI playback within Control Panel, it will also control sound playback in other applications.

The contrast with Windows' internal drivers is phenomenal, producing realistic effects for most instruments and also for common sound effects. The NovaStation naturally performs particularly well with XG format files.

One common problem with software-based synthesis is that it can provide a significant drain on your processor, since, unlike a soundcard, there are no dedicated chips to handle sound-related functions. However, even on a Pentium 100MHz system with 16M of RAM (the minimum recommended configuration for the NovaStation), we encountered no problems with

playing back music while running other applications.

If you want to regularly play back MIDI files or enjoy DirectSound effects, then NovaStation is worth considering. At \$99, it is considerably cheaper than purchasing a new wavetable-enabled soundcard, which typically cost \$300 or more.

However, Roland's competing VSC-550 bundle, which also comes with the DoRe-Mix and Cakewalk music-creation packages, is priced at just \$20 more than the standalone NovaStation package. If you are musically inclined, this is a better investment, but games-focused users should be happy with NovaStation's performance.

Angus Kidman

Venture NovaStation

■ Distributor	AusLinx
■ Phone	1800 686 400
■ Online	http://www.auslinx.com.au/NovaStation.htm
■ Price	\$99
■ In short	A useful addition for older soundcard owners, but a little overpriced.

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Lightwave 3D 5.5

3D graphics programs come in all shapes and sizes. There are the budget drag-and-drop, easy-to-use applications, and some good mid-range programs that approach professional standards for a few hundred dollars. Then come the professional-quality applications for Windows NT or Unix systems like 3D Studio and Ray Dream Designer; Lightwave 3D fits neatly into this burgeoning group. Beyond these are the massively expensive systems like Alias and Softimage, designed for Silicon Graphics or Windows NT workstations.

Lightwave 3D is a popular choice for many TV shows requiring 3D animations, as well as multimedia and computer games. It will run on Windows NT or Windows 95; and there is also a version for SGI and Sun workstations, though these cost significantly more (\$3,995). It also requires a hardware dongle, a plug that connects to your parallel port, and you must register within 14 days or the program shuts down (this can be done easily by faxing your registration card to New Magic — you get an immediate fax response). These inconveniences are common among professional graphics and audio programs, and it seems as though they will never change.

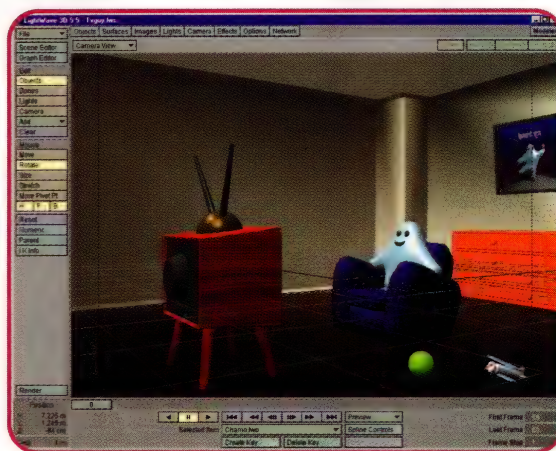
As with many 3D programs, the modeller comes as a separate application to the main rendering and layout engine, which is logical, and you can easily switch between the two. Also, like many programs of this kind, it tends to ignore Windows' conventions for keyboard shortcuts, so this aspect can take a bit of getting used to.

While the modeller offers the standard four window views, so you can see your object from any side, the Layout part of the program offers just one view at a time. Most of the important functions are easily accessible from the left-hand menu or through dialog boxes that pop up using the buttons along the top. Play and render controls are located along the bottom — moving around the program is logical once you learn the finer points of 3D animation, and there is a great deal of flexibility in choosing how things are done.

Major improvements in this version include real-time texture mapping in the Layout screen; a new Bones function which allows you to draw skeletal structures with

your mouse or tablet; and a new real-time 'play' mode to view animations without having to first create a preview. You can also make changes to an animation interactively while the scene is playing.

Inverse Kinematics functions have been sped up by 500%, and have some new functions for improved use. Textures



can now be fully animated, and a new Super Cel Shader turns 3D models into 2D cartoons and Anime-style films. Negative lighting has been introduced, and Area lights have soft edges on shadows. Other lighting effects, such as neon and fluorescent, have also been added.

The rendering engine has been updated to support 32-bit formats (meaning those with embedded 8-bit alpha data), and multithreaded rendering to take advantage of multiprocessor systems. There is also support for NT OpenGL drivers to speed up rendering, and OpenGL drivers are supplied for Windows 95 users.

Various special effects are available. A wide range is provided, including an atmospheric simulation with volumetric haze, clouds and sunlight, a Morph Gizmo which generates facial animations (great for speaking characters), and Lazy Points to create organic deformations based on an object's motion. More can be added using plug-ins which can be purchased separately, including Particle Storm, Lock and Key (a parenting tool for character animations), Ray Painter (for painting textures directly onto a model), Pyrotechniques (for fire and explosions), and Fiber Factory (for hair and fibre effects), to name just a few.

The camera has also been improved to hide unseen objects when rendering, and to give more control over the camera lens focal length and horizontal and vertical fields of view.

Among productivity improvements included in the program's modeller module are enhanced text modeling tools, a knife tool to easily slice objects to the desired shape, and a pen tool to draw whatever shaped object you require.

Other features worth noting are displacement mapping to add more realistic textures than simple bump mapping offers, and motion blur for fast-moving animations. There is also the Metamorphosing tool to morph one object into another. Fog is included for atmospheric effects and you can composite your 3D-rendered models over video footage.

Another feature is Screamer-Net, Lightwave's distributed rendering facility for rendering a large animation over a network of computers (up to 1,000 CPUs!).

There are two hefty manuals supplied: a user's guide to explain the ins and outs of the program, which works as a tutorial for all the program's various parts; and a reference manual that explains the program in even more detail. If you still need assistance, there is a series of tutorial videos available separately.

Lightwave 3D 5.5 is a powerful, full-featured 3D imaging and animation tool. If you are into creating 3D for multimedia or video, and want a professional tool at a comparatively reasonable price, this would be an excellent choice.

Philip Moore

Lightwave 3D 5.5

- **Distributor** New Magic
- **Phone** (03) 9532 9566
- **Online** <http://www.lightwave3d.com>
- **Price** \$2,695
- **In short** A powerful 3D modelling and animation tool for the budget-minded professional.

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1. U.S. Hard Copy Observer, August 1997. 2. Optional BC-61 CMY ink cartridge. 3. Speed is an estimate and, for comparability, is based on a competitive manufacturer's colour retail price, including tax. Canon Australia Pty Ltd ACN 005 002 951. Canon and the Canon logo are registered trademarks and PhotoRealism and P-POP are trademarks

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CS/4372

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We welcome comments and suggestions. Send correspondence to APC Readers' Say, PO Box 37, Sydney 1028; or by email to: APC@acp.com.au. All correspondence becomes the property of APC and is subject to editing.

Age-old problems

It has come to my attention over the past few months that the computer industry is in a poor state. The reason it has come to my attention is that I am in a consultancy position, and the question, 'Where do I buy a computer from?' is one I am often asked. At first I was reluctant to recommend any computer vendor. But I was asked so frequently, I was forced to find a suitable retailer. The main problems I find are poor-quality equipment, overpriced equipment, old technology, and missing driver disks or Windows 95 backup.

Let me explain.

Far too many vendors are selling systems with inadequate RAM. Sure, 16M of RAM will run Windows 95, but for an extra \$100 to \$130, the performance gained is remarkable. No system running Windows 95 should be sold with less than 32M of RAM.

Then there are retailers selling computers with no driver disks, and some which aren't even supplying the Windows 95 disk. This practice is all too common and the customer is the loser. Trying to get the disks out of the retailer is near impossible, while the retailer can use the disk multiple times to set up computers for the initial cost but passes on the cost to each customer. One retailer tried telling me that the driver disks and the Windows 95 disk are not needed by the customer.

Computer retailers just love to baffle customers with numbers and figures. By this I mean that computer salespeople must learn to speak English and explain what terms such as megabytes and gigabytes mean. Customers often walk away from a shop without making a purchase because of this. And when they do finally buy a computer, they are sick to death of having terminology thrown at them, and get to the point of buying anything to get the purchase over and done with. These practices must stop. I will personally be making every effort to expose retailers offering shonky deals when I am asked the 'Where do I buy a computer from?' question.

I would like to see APC doing reports about retailers based on visiting stores without warning. You should look for value for money, current level of technol-

ogy sold in the store, supply of driver disks, salesperson tactics, as well as performance and reliability of the machines on offer.

To all computer retailers: employ people in your businesses who know about computers, use your buying power to your advantage, talk to people in a language they can understand, give value for money, supply what is required, and don't dupe customers. Otherwise, you will only end up with a bad name and unhappy customers who will not come back.

Greg Lincoln
Petrie, Qld

Net price

I was amazed and more than a little angered when an IRC-friend of mine in the US enlightened me about just how much we in Australia are paying for our Internet services compared with the US.

I'm no expert in the economics of telecommunications, but I find it hard to believe that there is a legitimate reason why Internet users in Australia have to pay upwards of \$5 per hour, when users in the US can have continuous connections for around \$US30 a month! If there is indeed a good reason, I'd very much like to hear it. Remembering that we only recently discovered that Australians are paying about five times as much as they should be for their telephone calls, I suspect the overcharging is even greater when it comes to Internet fees. Is there any organisation which serves as a focal point to lobby for the rights of Internet users in Australia? It seems like we really need one.

Leo Freeman
North Rockhampton, Qld

PC no-show

I read Michael Veenstra's letter [APC May, page 78] with more than a little sympathy, and Mick Henderson's reply [APC July, page 46] with interest. In fact, I may have exchanged a wry smile with Michael as I wheeled my restless little one around the lobby [at PC97]. Mick Henderson does not realise that PC97 allowed babies and toddlers into the show, but that this year, for the first time, strollers and prams were not allowed.

As small operators in the IT industry, my wife and I are used to being patronised by the bigger players. But the organiser's Sydney representative took our breath away, after my wife pointed out that strollers and prams are no more a safety risk than goods trolleys and wheelchairs, by replying, "Well, the Darling Harbour Authority is considering banning wheelchairs too."

Mick Henderson, the PC Show organisers and exhibitors miss an important point about the computer industry. The 'suits' sneaking a few hours off work to leer at the lycra-clad babes and gawp at the latest 3D games often have no more say in their organisation's IT budget than the office cleaner or security guard. Our 'mom and pop' outfit, on the other hand, made recommendations on over \$5 million worth of purchases last year. Many of our clients are other small family operations.

But I will agree with Mick on his most important point. I too was disappointed with the quality of the show and its exhibitors, although I only got to half of those I intended to. Next year I'd like to see — assuming I make it through the wheelchair blockade — more informed staff on the stands armed with more useful information. Oh, and a creche at an hourly fee — after all, the show next door was able to provide one for its guests.

Paul Wallbank
Internet

Corrections

In APC's October issue, the article 'Lack of management could douse Net fire' (page 22) included the following sentence: "In a recent example, Creative Pacific accidentally posted customer credit card details to its site while it was undergoing maintenance." In fact, the incident took place on the Creative Technology site, based in Singapore, not the site of Creative Pacific, which is the company's Australian distributor. APC apologises for the error.

New Super Economy mode lowers costs in colour and B&W to print page after page after...

For just \$269 RRP, the new BJC®-210SP delivers both Photo Mode quality colour, and black & white at a speed comparable to a personal laser. It also helps lower operating costs in two ways.

Use 75% less ink. A new Super Economy mode has been developed.

It reduces ink consumption by 75% compared to Standard mode, and works in both black and white and colour printing.

Bigger black cartridge. In addition, there's the new high capacity black ink cartridge that holds 20% more ink than our previous cartridge, yet costs no more.

Up to 5 times the output. Combine these two features and the new BJC-210SP can print up to 2400 pages in black and white, and up to 600 in colour.

That's anywhere from two to five times the output of any direct competitor!

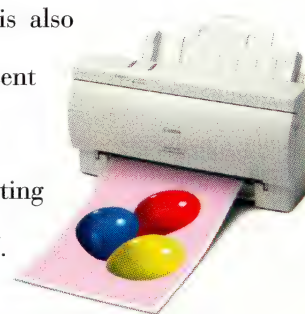
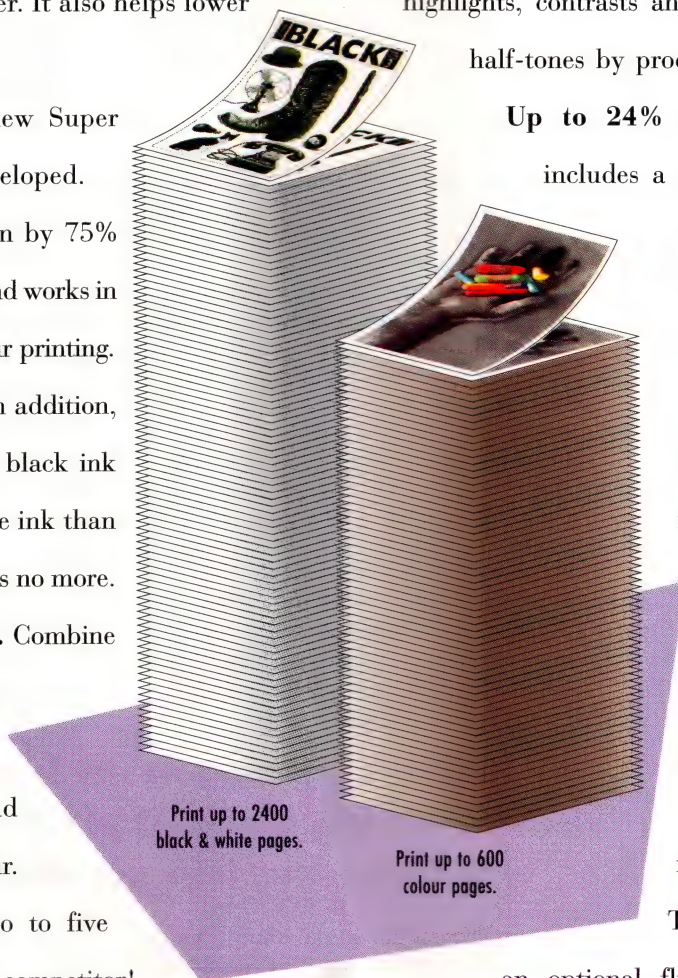
Photo Mode quality printing. Using the colour cartridge, included as standard, the BJC-210SP offers a choice of three high quality print modes – Normal, Fine and Photo.

Advanced half-tones. Photo mode uses the Canon Colour Image Processing System (CCIPS) to emphasise highlights, contrasts and shadows and visibly improve half-tones by producing a richer process black.

Up to 24% faster. The BJC-210SP also includes a black cartridge as standard. It has up to twice as many print nozzles as direct competitors, is up to 24% faster¹ and delivers resolution up to 720 dpi. Speed and quality are equally impressive in colour.

Canon Customer Care. All Canon printers feature a one-year warranty, upgradeable to three years for minimal cost, and are backed by hot-line support from our Customer Care staff.

There is also an optional fluorescent ink cartridge for high impact. For more information on cutting printing costs call 1800 021 167.



1. B&W speeds based on manufacturer's actual characters per second ratings. Price as shown is the recommended retail price, including tax. Canon Australia Pty Ltd ACN 005 002 951. Canon, the Canon logo and BJC are registered trademarks of Canon Inc. All other trademarks are the property of their respective owners. CS/4768

BJC-210SP – \$269 RRP

Canon



Sticky fingers

Maybe there's something we can learn from American rhetoric: the notion of ask not what your country can do for you, ask what you can do for your country. A bit more earnest attention to the premise might lessen the likelihood of our politicians ending up with . . . sticky fingers.

By Helen Dancer

When I heard that the newly appointed Minister for Tourism, Andrew Thompson, had given a press conference in Japanese, I was very glad. Glad out of all proportion, really, given that the incident that sparked the press conference was such a shameful and sad one.

But it was heartening evidence of a man so well matched to his portfolio. My radio idol Mike Carlton noted that it was testimony to our blinkered attitude that it had taken so long to get a tourism minister who actually spoke Japanese, but I'm just happy to applaud the fact that it has happened.

It was a salve to the weeks that preceded it, which saw hasty repayments of over-claimed travel expenditure, mass hypocrisy on both sides of the house and the departure of a Science and Technology minister who actually knew his stuff. I look forward to Mr Crean examining the travel claims of the members of his own fold in the near future with the same dogged scrutiny, but I won't be that surprised if it doesn't happen any time soon. He probably has more understanding of the value of having skilled people around him than he's letting on.

The fact is, there was nothing in the actions of the Opposition that week that served the national interest. No policy decisions, no implementation of necessary reform, no employment solutions, no resolve to get Australia towards a better future.

The biggest rort, in fact, was the number of parliamentary days, paid for by you and me, which were bereft of discussion of any kind that did not involve petty sums of repaid money. Cheryl Kernot, then the Democrats' leader, observed that the most immoral aspect of the whole affair was that so much parliamentary time was spent raking over the details and finger

pointing, instead of getting on with the business of governing, and I heartily agree. It's not as though there's nothing left to be accomplished!

What a shame it is when the national interest is not served, and the punishment doesn't fit the crime. Sacking can hardly be described as a fitting punishment for what happened. Don't get me wrong, there's nothing in my heart which can condone the abuse of privilege, wittingly or otherwise, but let's get this in perspective. If a child plays the violin with particular skill, but has a habit of pinching sweets from the corner store, the punishment should surely be based around teaching the child that pilfering is bad behaviour, rather than taking the child's violin away. Who misses the music when the child is banished to their bedroom? Us, of course.

There's nothing in my heart which can condone the abuse of privilege, wittingly or otherwise, but let's get this in perspective.

In a different culture, our minister might have been made to work out his punishment and continue doing the work that basically he had been contracted by us to do, because in that way the greater good is served. If there are people who understand technology actually working towards the formation of technology policy, then that in itself is in the national interest. But we prefer to banish the person, so that we can banish the uncomfortable truth from our minds.

We have lulled our politicians into thinking that we expect nothing from them, yet we are shocked when they behave accordingly.

Why do we pander to the tabloid headlines of \$600 here and \$1,500 there, instead of demanding that our elected representatives get on with the job they are

paid so handsomely to travel to, and stay overnight for?

The muddle-headed fractious foolishness of finding that we are forced to examine character foibles of people after we have elected them, rather than having put them more stringently to the test *before* we elect them, is made almost unbearable given the weight of blueprints for the future written with such alacrity as *Spectator or Serious Player* written by Messrs Buckridge and Allen, or the more recent Goldsworthy report. Both spell out with absolute clarity that what we have is a small window of opportunity to become international quality players in this global IT game.

Issues raised in these reports are not of the kind that we can afford to put on hold while we repair the damage done by such arrogant and blatant breaches of faith.

The biggest dilemma, of course, comes from finding politicians we can trust. It's self-evident that the people who are best able to carry out the mandate are also the ones least likely to accept the gong. What happened to John F Kennedy's rhetoric about going into government because you had something to offer, rather than just in anticipation of an extra \$300 a night?

Do we want the feeling of righteous indignation because we've caught another one with his fingers in the till, or do we want our own multimedia corridor, a gateway to technological prosperity, a proper place in a wired world?

Wake up Australia, otherwise we will have to accept that we will get the politicians we really deserve. ■

Brilliant colour, PhotoRealism and an extra large print head for **faster blacks.**

When it comes to versatility, the BJC®-4200 is ahead of its class.

Four printing systems. It accepts a choice of four different cartridge-based printing systems, designed to tailor your output to your printing needs. Two are included in the box as standard.

Photo quality CMYK. The first standard system is four-colour process printing, with driver settings for Economy, Text and Photo. The Canon Colour Image Processing System (CCIPS), and resolution up to 720 dpi, gives you outstanding half-tones by combining pure and process blacks.

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Don't be confused. Many manufacturers make all sorts of claims about pages per minute. But, in reality, using their own characters per second ratings, you'll find that the BJC-4200 can be more than twice as fast! (Also see output chart.)



Canon's exclusive PhotoRealism.

Third, there is Canon's unique PhotoRealism.

This option is more than just a claim, it is fast becoming the photo quality printing gold standard.

500% more colour combinations. Special low-density inks can vary the amount of saturation per pixel so that a single dot could have 0%, 33%, 67% or 100%.

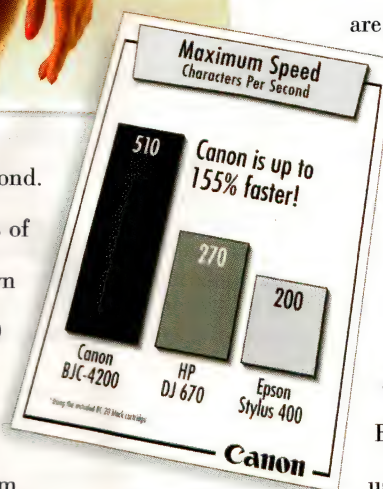
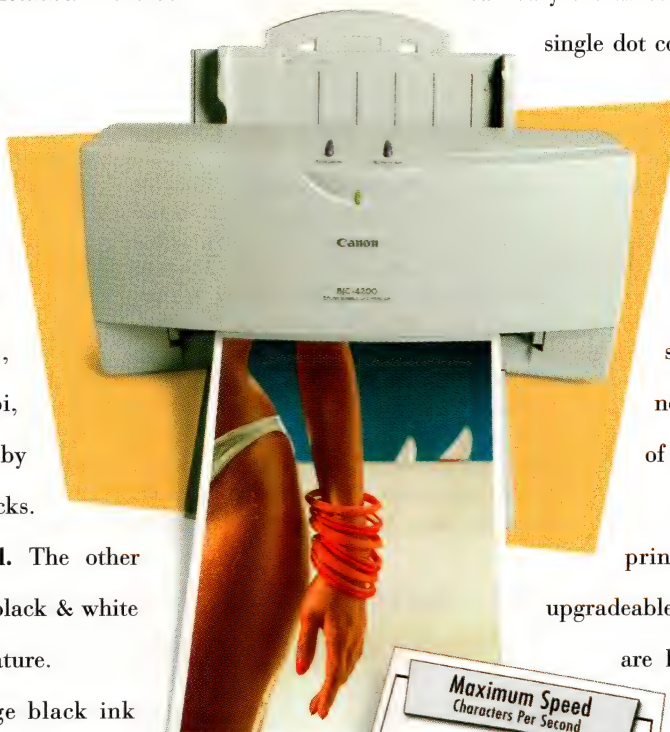
This produces up to five times as many colour combinations as conventional CMYK inks.

Virtually no pixelisation. The result is better half-tones and more subtle colour gradations, with almost no visible grain and dots, even in areas of low colour density.

Canon Customer Care. All Canon printers feature a one-year warranty, upgradeable to three years for minimal cost, and are backed by Customer Care hot-line

support. Finally, our fourth ink system, Fluorescent ink, is also an option, and drivers are available for DOS, Windows 3.1x/95 and Windows NT.

If you would like to learn more about tailoring the highly versatile BJC-4200 to your printing needs call us on 1 800 021 167.



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CS/4371

BJC-4200 - \$429 RRP

Canon



The control geek

What are the important things in computing today? What makes great software? What makes great hardware? Before I try to answer those questions let me pose one more question: what is the 'geekosphere'?

By Jeremy Horey

You'll find the answer in a small book just released here called *jargon watch: a pocket dictionary for the jitterati*. As you might expect from a book that doesn't use capitals, *jargon watch* is from HardWired, the book-publishing arm of *Wired* magazine.

In case you can't find the book or you don't have the right copy of *Wired*, here is the definition of the 'geekosphere': "the area surrounding one's computer where little trinkets, personal mementoes, toys, and monitor pets are displayed. The place where computer geeks can show their 'colors'".

There are some great words in *jargon watch*, although very few are words that we couldn't do without. But there are a few that describe things so that we see them for the first time as something distinct and new.

Geekosphere is one of the words that we do need. It describes something that anybody who has ever worked in an office with computers will have noticed. People decorate their computers. It may be a collection of plastic toys from inside chocolate eggs, or coloured Post-it notes, or objects stuck on with Blu-tack, but it is rare to find a completely unadorned computer. By giving us the name, geekosphere, 'jargon watch' gives us a name for this phenomenon.

My geekosphere is relatively unadorned. At work I have a red rubber brain, courtesy of Novell, on top of my monitor. Not only is it a distinctive object, but it's great for stress relief. A few squeezes of the brain in the middle of a difficult phone call keeps me calm. But there are some magnificent examples of the art form around. I've seen monitors decorated with a row of fingers broken from shop dummies and attached with Blu-tack. One of the guys at work has his monitor rim covered in eye-popping doodles done using fluoro pens.

Then there are ersatz geekospheres that you sometimes see. These are the cardboard rims that fit around monitors to make it look like the monitor is in the middle of jungle or on the beach. These are merely quick fixes for those keen to jump aboard the geekosphere bandwagon, but without a serious commitment to the art form.

The geekosphere is an interesting phenomenon. But it is also an extra piece of evidence for my argument that what is important in computing is the 'personal'. We are surrounded by a complex society. Often we have very little influence over

screensavers go even further and add entertainment elements. The geekosphere is an extension of this. We are used to seeing abstract, interesting images onscreen, and now we are decorating the area around our monitors with objects that seem to fit in with the onscreen environment.

It seems that Microsoft is aware of this desire to customise and personalise. Internet Explorer 4 takes the screenscape a step further. It gives users the ability to modify their working environment even more. So if I am right about this, what makes great hardware? Part of our inexhaustible thirst

Whenever we have an opportunity to make the computer adapt to us, we take it.

things that affect our lives. So we look for things that we can control. In computing what we want is the feeling of control.

The computer is in many ways a demanding work partner. It will only obey our commands if we get those commands exactly right. It demands from us precision and a knowledge of its methods. So whenever we have an opportunity to make the computer adapt to us, we take it.

If you were to line up a hundred different PCs running Windows next to each other, they would all look different. In some cases the organisation of icons and menus might be slightly different, but others would be works of art with unique images for wallpaper, individual icons and small animations or pets living on the workspace. There is a whole range of software that caters to the need to personalise our computers. There are screen savers, 'epets', desktop themes and images for wallpaper. Of course, some

for performance in personal computers comes because we want to have all these extras as well as our normal programs. They all slow down the processor by using resources that we could use in other ways. But we want that hardware to work smoothly. We don't want it to get in the way. We don't want to be continually playing with hardware to make it do what we need.

In software, what we want is the ability to fit the software to our needs. But at the same time the software must work smoothly. If it gets in the way and demands too much from us, we are unhappy. The truly great piece of software is the program that puts me in control, but only when I want to be. It's the piece of software that is so good that I don't need my geekosphere to make me feel that I, and not my computer, control what is going on.

You can reach Jeremy Horey at jhorey@ozemail.com.au.

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IrDA cable-less communication
for printing and scanning.



Read the features and you'll swear the BJC®-80 would use half your desktop, not half your briefcase.

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It's hard to believe that colour this good can come from a printer so small.

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Two ink drop sizes. It produces dual drop sizes in all four CMYK inks, in resolutions up to 720 dpi. The result is smoother colour gradations and less grain on all paper types.

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Send a fax, scan in colour. Next there's the optional colour scanner head. You can simply substitute it for the printer head.

There is a high-speed mode for faxing*, and a high definition mode. The latter is ideal for colour graphics and OCR, and reads up to 360 dpi, 128 monochrome levels for OCR, and 64 colour levels for RGB.

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The BJC-80 accepts an optional battery pack as well as standard power. And to make your life easier, it comes with a Windows 95 infrared IrDA compatible port for cable-less communication.

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The BJC-80 even includes an Image Optimisation feature that reduces the jagged images and faded colours common to Internet images, and works with a variety of graphic applications.

Canon Customer Care. The BJC-80 features a one-year warranty, upgradeable to three years for minimal cost, and is backed by Customer Care hot-line support. Drivers are available for both Windows 3.1x/95 and Windows NT.

To learn more about the other half of your portable office, call us on 1 800 021 167.

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BJC-80 – \$499 RRP

Canon



Don't judge a book by its cover

New PCs are pretty as a picture, and designed to impress . . . but at what cost?

By Jeremy Torr

At lunch recently, I was chatting to one of the top dogs at HP, John Bieske. He was telling me about the new direction HP was taking, how it was going to get to number one (the same thing IBM, Compaq, Dell, Gateway and Acer had told me over the last couple of months — it certainly is going to be crowded at number one), and how one of its main routes to success was going to be via the small business player and burgeoning home market.

In passing, he mentioned the new Pavilion PC that has been designed for the home market. What caught my attention was not the fact that it had EDO RAM, its fast level 2 cache, or even its MMX capability and 24-spin CD-ROM drive. In fact, Bieske didn't even mention these things at all. He said the new model was slated to do really well for HP because: "it has a new, rounded shape, better speakers, a keyboard with knobs on and a new colour scheme". Not a squeak of information about the works in the box. According to HP's research, the decision to buy a particular computer is based on external appearances just as much as the specifications. Because they look nice, sound good and do the job.

Had I been sitting down with HP two, even one year ago, it would be an almost 100% bet that the newly released model would be billed as the best yet. But that claim would have been backed up by an impressive list of technical specifications, and benchmarked power ratings as long as your arm. Just a few months and a couple of model changes later and we are talking touchy-feely, warm and attractive — stuff the tech specs. A major change of direction indeed.

The design factor is becoming increasingly important in computer marketing. Compaq is producing the Presario Noir. IBM's Aptiva has a huge handle on it, to make it look as powerful as Hercules.

Gateway has linked the PC to the home theatre and produced a hybrid that certainly doesn't look like a computer.

What we are witnessing is the death of the box. The PC is no longer just a case containing technology, it is a functioning gestalt item like a stereo, a TV or a car. Function is almost a given, but design is just as important, if not more so. It's true that the people who produce these new machines aren't really that comfortable with the concept of ergonomic and industrial design — many products look like a fit of giggles made solid in the design department. But the really interesting thing about the death of the box is that the time has arrived to make it happen. It can be likened to the time when 27in wheels

are happy to ask if it will run Office 97, if it can connect to the Internet, and if it will be able to print in colour, but the way these things happen is becoming less important by the month. It's a bit like a Porsche buyer only needing to know that the car is fast — not that it uses hydraulic backlash compensated tappets working on a multi-lobe camshaft to do it. As long as it produces the goods, buyers perceive they are getting value for money and are happy.

So if it looks good, then it will sell well and everybody is happy. For me, however, there is a small cloud on the horizon. This concentration on appearance can only cement the imposition of internal standards such as the Wintel chip, Windows, and that

As long as the thing works, an amazing number of users aren't really that interested in what is inside [their computer].

and tyres were first fitted on bicycles back around 1900 — a standard had been set. And the world would use it.

Now PC buyers are sufficiently knowledgeable to understand what they want, and what they want is the standard product. Any buyer, whether choosing for a major corporation or a home office, will expect some genre of Windows to be both loaded and running, they will expect a standard floppy disk and CD-ROM drive, a QWERTY keyboard and mouse, and they will expect the PC to come with a three-pin plug on the end to fit their power outlet. Apart from that, as long as the thing works, an amazing number of users aren't really that interested in what is inside. They

oh-so-archaic QWERTY keyboard. Now we have arrived at the plateau where casing design is the ultimate selling lever, will the actual pace of development slow down inside the PC — because it is less important in terms of sales? The breadth of development in the industry to date has been driven by myriad individual geniuses working away on weird ideas that might just work because there was no set standard. Now the technology is virtually cast in stone, are we going to see the diminishing of real, valuable, new technology developments as the megacorporations consolidate their winnings, and just more pretty new cases to tempt us to buy? ■

Canon's BJC-240 is the only printer to offer **PhotoRealism. For just \$349.**

Although many printers claim "photo quality printing", there is a big difference between "photo quality", and PhotoRealism.

Exclusive to Canon. PhotoRealism is an exclusive Canon invention. And it comes as standard on the BJC®-240. But no other printer in its class offers the equivalent, even as an option.

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Multiple colour choices. The BJC-240 comes with two different colour ink cartridges as standard – PhotoRealism

inks and conventional ink for outstanding

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**PhotoRealism is not just a description,
it is Canon's unique photo printing process.**

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If you would like to learn more about the differences between true PhotoRealism and conventional photo quality, call us on 1800 021 167.

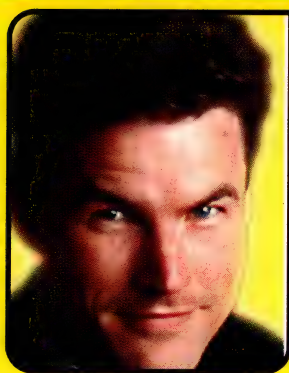


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CS/4444

BJC-240 – \$349 RRP

Canon



The silly season

As the year draws to a close I can expect to be asked the same question at least 50 times by various manufacturers, publishers and resellers: 'Will it be a big Christmas this year?'

By Bruce McCabe

Everyone is keenly aware of the December buying season (and, increasingly, the post-Christmas sales in January) and how important it is to vendors making their targets for the year. The question might be a little repetitive, but it makes a nice change from being asked if Apple will survive, or if the latest round of PC price cuts will spark a 'price war' — topics that journalists never seem to tire of, no matter what the time of year.

There are no monumental product releases expected to coincide with Christmas 1997. There is no Pentium launch or Windows 95 release to take the market by storm. MMX just missed getting to market for Christmas '96 and has been out long enough for the hype factor to have died away. Pentium II? Although it has been out for six months everyone still really wants one, but how many of us can afford it? New Pentium II machines will be hot items in high-income households, but pricepoints won't have dropped quite enough for mainstream buyers by December.

The Tamagotchi fad will definitely be on the downward curve by Christmas too. These things seem to go through about six phases — cute, captivating, addictive, boring, annoying, passé — over as many weeks. My niece was given one recently and, while she had lost none of her interest, her father had gone through all six phases in the first three days. The Tamagotchi's continued beeps for attention finally drove him to the point where he had to pull the batteries out or risk losing his sanity.

But just because people won't be lining up at midnight for a new operating system (get a life), it doesn't mean computer retailers are in for a glum Christmas. On the contrary, there seems to be plenty of spark in consumer technology at the moment.

For starters, while Pentium II configurations might be out of range, there will be plenty of PC deals based around high-end

Pentiums which will make mouths water. Most of this will be driven by PC-clone assemblers, but there should also be a great deal of interest in sub-\$2,000 multimedia configurations from brand-name vendors. Christmas should also be a good time to buy memory and hard-drive upgrades.

In the world of computer peripherals, digital cameras are starting to become really interesting. Up until now, most of the models I've spotted have been in the hands of Japanese tourists, but local prices are becoming more accommodating. Additionally, consumers are now more aware than ever of the benefits — especially getting instant results after the pictures are taken.

Just because people won't be lining up at midnight for a new operating system, it doesn't mean computer retailers are in for a glum Christmas.

OK, we are far from seeing the real boom in digital photography. This will only come when two conditions are met: resolution levels sufficient to produce quality enlargements, and a range of available lenses as broad as that of the 35mm SLR. But in the meantime, any announcements of small, general-purpose cameras at attractive prices are certain to be well received — and digital cameras will be on more than a few shopping lists this December.

There will be intense activity in colour inkjet printers partly driven by digital photography. Once again, everybody wants one and they are more affordable than ever. Canon and Epson are leading the way here — \$350 is all it takes to get you a decent 720 by 720dpi machine. For only \$100 more you can boost the resolution to 1,400 by 720.

The games console should be bigger

than ever this Christmas. Sega, Sony and Nintendo have been competing so aggressively over recent months that prices have fallen to ridiculous levels, and it seems you can't turn on the television without being dazzled by yet another high-energy commercial demonstrating MEGA sound and AWESOME graphics. These devices have never been a favourite of mine because of their inflexibility (having been built to perform a single task very well), but the value for money now available (\$199 buys a 64-bit machine packed with leading-edge componentry that produces blistering graphics performance) is outstanding. Someone who is in a good position to know

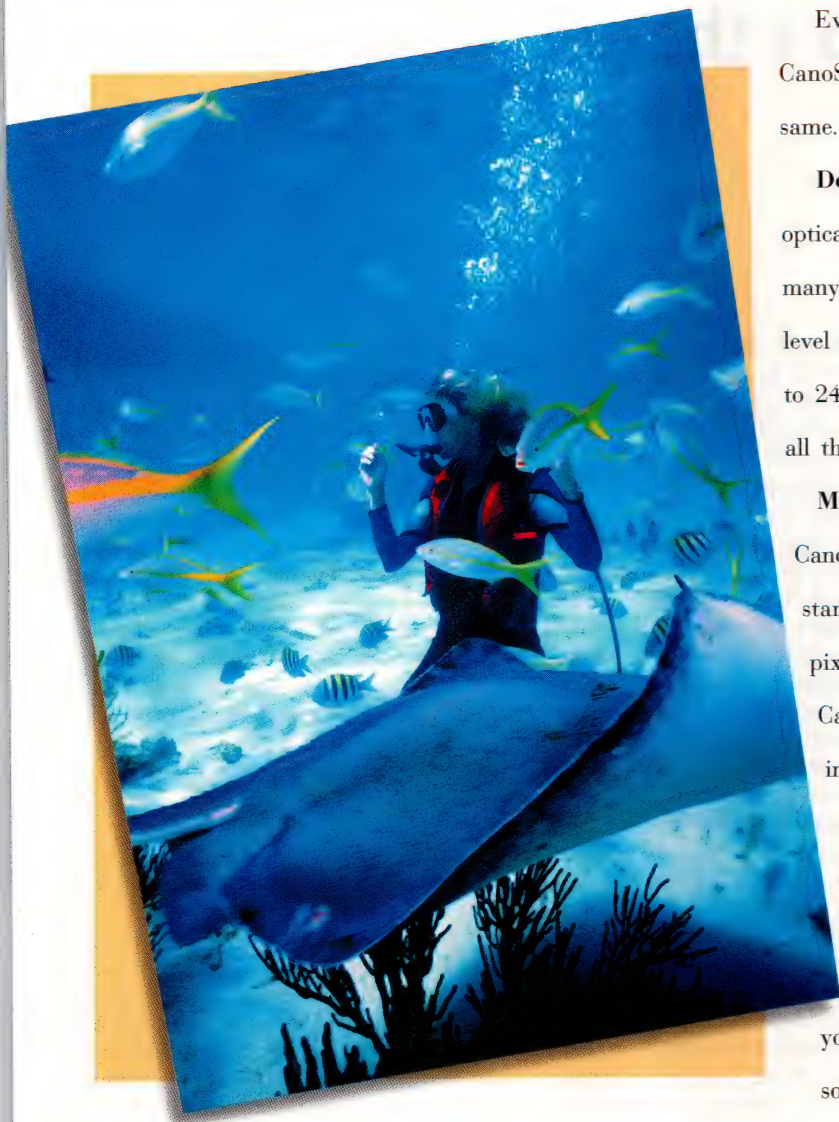
the component costs told me recently that he believed the \$199 pricepoint was so low that manufacturers could not be making money (although the games cartridges are undoubtedly very profitable).

Last, but by no means least, we can always rely on software publishers to bring a swag of new entertainment releases to market in time for Christmas. A few will be totally new concepts, but many will be recycled versions of proven titles which have the same engine, but beefed up graphics, gameplay and storyline. Crude maybe, but it works every time.

By and large, computer retailers won't have much to complain about this Christmas — except maybe the odd stock shortage.

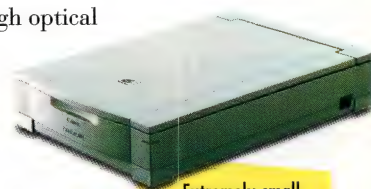
Bruce McCabe is a senior industry analyst with Gartner Group/Dataquest.

High optical definition and up to 30-bit colour scanning for more colour depth.



Even a quick glance at the incredibly small foot-print CanoScan™ range suggests that not all scanners are quite the same. Look more closely and you'll find even bigger differences.

Definition up to 8000 dpi. Canon scanners start with true optical definition as high as 1200 dpi, up to double the level of many direct competitors. This high optical level can then be enhanced up to 2400 dpi, and interpolated all the way to 8000 dpi!



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Model	CanoScan 300	CanoScan 600
Interpolated Resolution	Maximum: 4800 dpi	Maximum: 8000 dpi
Enhanced Resolution	1200 x 1200 dpi	2400 x 2400 dpi
Optical Resolution	600 x 300 dpi	1200 x 600 dpi
Colour Input	27-bit (9-bits per colour)	30-bit (10-bits per colour)
RRP*	\$499	\$799

*Prices shown are the recommended retail price, including tax. Interpolation dependent on driver and software used. Canon Australia Pty Ltd ACN 005 002 951. Canon and the Canon logo are registered trademarks and CanoScan is a trademark of Canon Inc. CS/4370



Canon



Knock knock. Who's there?

Digital signatures combined with public key authentication are about to open up the electronic commerce marketplace in a big way and with a high level of comfort and safety.

By Phillip Argy

Imagine that one day you are relaxing at home, just minding your own business, when a summons is served on you asserting that you owe someone \$5,000. You accept it dismissively knowing that you don't owe any money, but reading through the document you start to get a little anxious when you see that the plaintiff claims to have an IOU bearing your signature. Let's have a closer look at signatures, and then see how electronic commerce differs from paper-based commerce.

First, a signature is simply a mark that evidences an intention. The intention may be to be bound by a contract, or it may be approval of a document, or it may be merely to verify that you've witnessed something (perhaps someone else's signature). Secondly, the underlying principle of a signature when it is used to evidence an intention to be bound contractually, is that you can't subsequently change your mind or deny that you had the intention. If things were otherwise, signatures would be worthless. But, just to be sure, we invented witnessing arrangements so that others can be called to give evidence that they personally saw you sign, and that you weren't drunk and seemed to know what you were doing.

These supplementary mechanisms are just examples of methods that we have devised to persuade a court that someone who denies their signature can't get away with doing that. So, returning to our opening scenario, if no-one witnessed your signature, and lots of people can be called to give evidence that your normal signature is nothing like the one on the IOU, then maybe you'll escape the horror with a judgement in your favour.

Now let's look at where we're headed with electronic commerce and digital signatures, and what's known as the public

key authentication framework (PKAF). Most people will be familiar with the points system that applies when you want to open a bank account or apply for a passport. You know, the kind of thing where you have to produce your licence, your rates notice, a credit card, and other bits and pieces that essentially are just evidence that other people in the past have been persuaded that you are who you claim to be. Logically, if you have enough independent people who will certify your identity, the bank or passport office can minimise (but not eliminate) the risk that you are masquerading as someone else.

Armed with enough 'points' documents, you now front up to a trustworthy institution (a certification authority) and ask to be issued with a public key and a corresponding private key. Basically, this is just a pair of 128-bit keys that are unique to you (unlike a PIN of today that has just four digits, giving only 10,000 unique permutations). The certification authority keeps your public key on file, and anyone in the world can download it from there and verify it. Since your identity has been certified and is on a public register, anyone using your public key can be pretty comfortable that any document it decrypts can only have come from the holder of your private key. Whether or not that is you depends on how carefully you protect your private key — that is absolutely fundamental and needs to be taken seriously (certainly more seriously than a lot of people apparently take the security of their PINs today).

If you encrypt the document with your private key, not only can it not be decrypted without your public key, but it also can't be interfered with, because the decryption process will reveal an altered document (the encryption process results in the generation of a check value that has

to match for a successful decryption, and changing even a single character in the original will give a different result). Pretty neat, eh? It gets better.

Let's assume that not only do you want to make sure a recipient knows that the document came from you, it would also be nice if you could make sure that no-one else could read it either. So what can you do? You go to the certification authority (and there will be many of them all over the world) and get the public key for the addressee. Then you encrypt your document twice — once with your private key, then again with the addressee's public key. Now you can be quite sure that the only person in the world who will be able to read your document is the person who not only has your public key (well, that's easy — it's public), but who also has the private key for your addressee.

Provided the integrity of the certification process is rock solid (and we may need some laws to help guarantee this), we have a very secure way of exchanging information of all kinds, and we no longer have to worry about the physical security of the message in transit or even after its arrival. In fact, you could do the equivalent of leaving it in the street and no-one but the intended recipient would be able to read it. You will be able to safely encrypt such things as your credit card number, your instructions to your bank, and your order for home shopping. Who said life wasn't meant to be easy?

Philip Argy is the head of the Intellectual Property, Trade Practices and Technology Group at law firm Mallesons Stephen Jaques. He is also national vice-president of the Australian Computer Society.

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Prices shown are the recommended retail price, including tax. Canon Australia Pty Ltd AGN 005 002 951. Canon and the Canon logo are registered trademarks and PhotoRealism and PowerShot are trademarks of Canon Inc. All other trademarks are the property of their respective owners.

CS/4368



The professional quality PowerShot 600.

"If you will be using a digital camera often in your work... the best choice is the PowerShot 600..." PC Magazine, Australia, March 1997.

"Of all the digital cameras we've tested, Canon's produces the best looking images..." Australian PC World, April 1997.

"The first digital camera we've seen (that) produces sufficiently high resolution and high quality images to survive digital manipulation..."

Windows Sources, July 24, 1996.

"... (in its price class) the PowerShot 600 is overwhelmingly the best choice." PC Magazine, US, January 1997.

Only \$1299 RRP. It's been described as the best camera on the market for the price. And that was before we lowered the recommended retail price to just \$1299.

The PowerShot 350. Just \$899.

Then there is the incredibly simple to use PowerShot 350. The LCD screen on the back is both a viewfinder, and picture editor.

It provides information on camera functions and allows you to monitor, review, delete and re-order shots, while providing more space for new shots.

Fully automatic. It features a vast range of shutter speeds, macro focus, and the ability to accept optional third party wide-angle and telephoto converters.

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Nothing else to buy. Standard accessories include a 2 Mb PCMCIA CompactFlash memory card, serial cable for PC connection, NTSC "video out" for TV display, long-life re-chargable NiCd batteries, re-charging kit and PhotoImpact 3.0 SE (Windows 95).

For more information call 1800 021 167.



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Canon

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Protection that never stops. New viruses are constantly appearing. We work to ensure that you always have current protection which is dependable, functional and user-friendly. In each quarterly update you'll receive protection against around 500 new viruses.

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If you want to cruise the Internet in the fast lane, 56Kbps is your licence to speed. But buyers should proceed with caution.

56Kbps modems

The presence of two conflicting and incompatible standards has meant that 56Kbps (56K) modems have had a slow and somewhat rocky start in the dial-up sweepstakes. Little more than year ago we saw technology tweaks to modem chipsets inside 28.8Kbps (28.8K) modems deliver a burst enabling them to achieve up to 33.6Kbps, although many Internet service providers seemed slow to respond at first.

Now 56K is all the rage. Both large and small ISPs are installing 56K racks and aggressively chasing customers who have succumbed to that seductive need for speed. With prices for 56K modems hovering around the \$350 mark and bottoming out as low as \$250, newcomers to the Net are bypassing 33.6K, and 28.8K users are upgrading in droves.

For this month's Price Watch, we sought advice on which type of modem a novice should buy, for both the Internet and for two-player, Doom-style gaming across phone lines with a friend in a nearby suburb. We also sought information on 33.6K versus 56K, including the two competing 56K standards, x2 and K56flex, and asked about SVD (Simultaneous Voice and Data) modems, to enable

gamesters to talk and stalk at the same time.

From the very beginning it was apparent that many retailers lacked the basic ability to listen to their potential customers, to ask questions to assess their needs and budgets, and then make appropriate recommendations. The staff at Harris Technology, Dick Smith Elec-

tronics employee in Melbourne.

Of the modems suggested by the 10 retailers quizzed by Price Watch, the Banksia Wave SP and NetComm Roadster series were most often suggested — its quality, ease of use, warranty and made-in-Australia status were all cited. Other modems near the top of the list included

Few of the retailers we spoke to suggested 56K at the outset, favouring upgradable 33.6K technology as best value

tronics, Modem Superstore, International Software Warehouse and Queensland Computers considered our needs to some extent before suggesting options for modems and technology. Only a handful suggested SVD without prompting.

Attitudes and degrees of knowledge varied immensely. The helpful attitude, courteous manner and expert knowledge of the assistant at Melbourne's Modem Superstore was delightful, particularly when compared with the disinterested and

the US Robotics Sportster, Hayes Accura and Web Excel, although KTX's relatively anonymous modem came highly recommended by the enthusiastic sales rep at Queensland Computers.

Few of the retailers we spoke to suggested 56K at the outset, favouring upgradable 33.6K technology as best value. In several cases the existence of 56K, and the presence of two competing and incompatible standards, went unmentioned until Price Watch raised the issue. The apparent lack of confidence in

56K modems

Retailer	Telephone	33.6K	56K
Adelong Direct	1800 626 345	Not recommended	NetComm Roadster or Banksia Wave SP, both "around \$299 cash"
Dandenong Discount Computer Centre	(03) 9670 1631	USR Sportster Flash, \$235	Not recommended
Dick Smith Electronics	(08) 8232 1200	Spirit \$179	AusLinux Kookaburra \$249
Harris Technology	(02) 9957 1142	Not recommended	Hayes Accura \$287
International Software Warehouse	1300 360 799	Banksia Wave SP \$229	Banksia Wave SP \$319; NetComm Roadster \$279
Modem Superstore	(03) 9899 4744	Not recommended	Suggested any model US Robotics; NetComm, Hayes or Banksia would be suitable
Pacific Microlabs	(03) 9670 1533	Banksia Wave SP \$209	Not recommended
Peripherals Plus	(02) 9630 3166	USR Sportster Flash \$259	Not recommended
Queensland Computers	(07) 5529 0886	Web Excel \$129	Web Excel \$209
Rod Irving Electronics	(03) 9663 6151	Web Excel \$149, NetComm Roadster \$230	Web Excel \$199

56K and the reasons given by resellers were, to be honest, quite frightening — both for the customer seeking accurate advice, and for modem manufacturers, who naturally enough are rather keen to sell their 56K hot rods.

The best summation came from Queensland Computers which told Price Watch that “33.6 is the norm right now and 56 is good if you can afford it”. Perhaps the most common response was that not enough ISPs had 56K dial-in lines to make it worthwhile, or the belief that none of them supported 56K at all.

Most seemed completely ignorant of the fact that Australia's two largest ISPs, Telstra Big Pond and OzEmail, were, at the time of writing, rolling out 56K points of presence (POPs) around Australia and already had 56K dial-ins, sometimes supporting both x2 and K56flex. It also seemed short-sighted to steer buyers towards 33.6K modems which would, in all likelihood, be superseded by 56K within six months. That said, all dealers recommending the US Robotics Sportster Flash explained its ability to be ‘flash upgraded’ to 56K by downloading a free upgrade patch from the Internet, though most didn't realise that the patch was already available.

More seriously, only one company — Modem Superstore — highlighted the need to get the same 56K technology as your ISP (that is, either x2 or K56flex at both ends) in order to approach 56K speeds, otherwise the connection rate will be limited to 33.6K. Most stores made no mention of the incompatibility problem and only a few indicated that 56K occurs only on the download side of the line and the upward stream from the user onto the Net is pegged at 33.6K. Only one, Modem

Superstore again, cautioned that not even 56K could be guaranteed, due to line conditions. None admitted, or perhaps knew, that realistic speeds for 56K modems hover around the mid-40s reaching just above 50K, and that they require a digital exchange at the user's end and a full digital path through to the ISP.

In a similar vein, when we asked if two people, each with 56K modems, could get 56K if they placed a modem phone call between the two PCs, the representatives from Queensland Computers, Dick Smith Electronics and Rod Irving Electronics all said yes. In fact, end-to-end dial-ups are limited to 33.6K, with 56K only available if one side of the connection is outfitted with a digital concentrator.

Confusion over the duelling standards was also a problem for retailers. Only Modem Superstore, International Software Warehouse and Queensland Computing were aware that a single unified standard was being developed, which was expected to be released by mid-next year. No dealer seemed aware that all 56K modems can be flash-upgraded to the ITU's new standard once it is chosen.

Also disappointing was staff knowledge of their modem bundles. Almost every modem comes with a starter kit that allows the novice user to automatically set up their PC, and join an ISP; a customer will generally have some free online time thrown into the bargain. The dominant player in this field is OzEmail, which provides a generous 50-hour package for 56K dial-ups; such a freebie could be a real drawcard for first-time Netizens.

But did the salespeople know? “I think you get five hours or something like that with CompuServe or OzEmail or someone, I think,” was the forthright word from

Our charter and method

Price Watch is an exercise in comparative technologies, relative prices and human nature. All investigations are conducted anonymously, and records are kept of conversations. Prices and system capabilities printed here are provided by the sales staff at the offices we contacted, and all information is as supplied. While we assume that these are correct, we cannot accept any responsibility for errors or omissions. Neither will we be held to account by companies mentioned here for omissions to product ranges or system capabilities. The responsibility rests with sales staff to provide adequate information, as the company would expect them to do with every customer.

Peripherals Plus. Price Watch recommends that shoppers examine the whole package, not just the modem speed and price. Sales staff should also become more familiar with the product they are selling.

It's clear that the misinformation available about 56K modems is not confined to first-time buyers. Price Watch suggests buyers arm themselves with as much background material as possible, realise that retailers are rarely well informed and objective, and as always, shop around — for the best advice, best service and the best price.

Given the explosion of interest in the Internet and the push of computers into the consumer market, PC retailers need to sharpen their act. Price Watch urges modem manufacturers to play their part in creating satisfied and confident customers by issuing dealers with FAQs and conducting training sessions in modem know-how. ■



CONSUMER RIGHTS

Letters revisited

In APC's July 1997 issue (page 78), we printed a letter from Christine O'Connell, a reader who was having problems with a Packard Bell machine she purchased from Grace Bros' Macquarie store in NSW.

After enduring months of problems with the machine, her money was refunded by the retailer. However, she was still waiting for Packard Bell to refund \$175 she had paid for a two-year extended warranty.

In early September, O'Connell contacted APC to tell us the warranty issue had yet to be resolved. As a last resort, she took

the matter to the NSW Department of Fair Trading where a mediator dealt with the company on her behalf. She said that after being promised a refund three times by Packard Bell, the company then stated a refund would not be forthcoming.

APC contacted Packard Bell on the reader's behalf to seek clarification. Packard Bell stated it would look into the issue. A few days later, the company contacted APC to say that (despite the numerous problems the customer had with the PC, including the inability of Packard Bell technicians to satisfactorily repair the machine) Packard Bell was of the view that “there was no justification for a refund as there was nothing wrong with the PC”.

However, we were also informed that a refund cheque had in fact been drawn up recently and that APC's intervention was “apparently more coincidence, rather than any reason for influencing the final outcome”. APC was also asked by Packard Bell to “please forward our apologies to Ms O'Connell, who obviously has a preference for communicating through your magazine”.

When APC contacted Myer/Grace Bros, a spokesperson declined to comment on its future relationship with Packard Bell, stating only that the retailer would continue to stock the brand for the time being.

Roulla Yiacoymi

Cheap PCs are no reason for vendors to offload dodgy equipment to the unsuspecting consumer.

The three Rs of PC consumer rights

With Christmas 1996 known as the year retailers sold bargain pre-MMX PCs, 1997 is shaping up as the year Pentium MMX machines will be going cheap to make way for new Pentium II-based PCs.

But just because a computer is going cheap does not mean the retailer should get away with selling a defective or mechanically-inferior machine.

As a consumer, you should be aware of your rights as you prepare to spend your hard-earned dollars in the festive rush.

Have I got a deal for you!

Any salesperson who uses this, or a similar line, should be avoided. High-pressure salespeople are interested in only one thing — making the sale. They are not genuinely interested in your needs, although they will pretend to be. If you hear the line 'I can give you a special price, but only if you buy today' or 'I can throw in software galore, just for you', you may want to question the motives of the salesperson. If the machine is one you want, go for it. But you may later regret a snap decision made without careful research.

Keep in mind that price is not the be-all and end-all when buying a PC. The cost of a solid warranty plan alone is worth a few hundred dollars of the machine's price. The quality of components, type of processor, and amount of RAM will all affect the price.

Can I get a quote for that?

Whenever you ask for a quote for a PC, make sure it is a written one, with details of the machine's specifications. Unfortunately, a verbal quote counts for little in the real world, even to the extent that a vendor will dispute what one of its salespeople has said to you. If it's in written form, there are no two ways about it.

One important point about getting a quote: never sign anything. We've received reports of people being asked to sign quotes, only to later find they were actually signing a contract obliging them to purchase the PC in question. Simply obtaining a quote does not require you to

sign or pay anything. A deposit should only be paid after you have agreed to accept the quote. Never pay for a machine in full before actually receiving the goods.

What a great warranty!

At APC, we've seen companies come and go as a result of their seemingly generous warranty offerings. If a warranty deal seems too good to be true, often it is. A five-year onsite warranty sounds impressive, but you need to ask the retailer a few questions first.

What happens if the company goes bust? Who will honour the warranty? What you need to know is whether or not the warranty is an 'insured' one. This means the warranty is financially backed, and that you will still have an effective warranty even if your vendor disappears off the scene. In effect, this is added insurance for the buyer. You may want to think twice about buying from a relatively new vendor offering an uninsured warranty. Check also whether the warranty covers both parts and labour.

The next thing you need to know is the name of your nearest repair centre. If a retailer offers an onsite warranty, it should have a repairer in your area who can come out and fix your machine when necessary. Consumers who buy their machines from an interstate vendor need to be particularly careful about this. A store based in Sydney may not have repairers in remote areas, or even in other states. In such cases, the machine may need to be shipped back to the place of purchase — an often time-consuming and laborious task. You may realise that for a few dollars more, you could have bought from a local vendor with the peace of mind that any potential problems could be dealt with locally.

This brings us to the issue of response times. Make sure you have, in writing, the time it would take for someone to come and look at your machine. If the contract says a repairer will be onsite within 48 hours of a problem being reported, you may be able to at least work around the problem knowing help is on the way. Remember, just because someone says they will fix your machine doesn't mean

they will do it immediately. Those who have had to wait weeks, even months, for repairs, will appreciate the importance of having a response time in writing. Don't forget to keep your written quote and all receipts.

One practice consumers should be aware of is the 'warranty void if seal broken' scam. It is unlawful for a vendor not honour a warranty because a sticker placed on a PC states so.

If once you have bought your PC or PC component you find that the goods you have received do not match those you agreed to buy, do not do what you specified you wanted them to do, or are defective, then contact the retailer immediately.

If there is a problem, remember the three Rs of consumer rights: repair, replacement, or refund — it's *your* choice. If the fault is minor, you may wish to accept a repair, but do not let the retailer fob you off. If the retailer is not interested in your complaint, contact your state fair trading or consumer affairs department. They will advise if your complaint is justified and help you come to a satisfactory resolution with the vendor.

Roulla Yiaccoumi



CONSUMER

Tell us about it

Service & Reliability is APC's consumer column. We invite you to send details of your buying experiences to:

email complaints@acp.com.au
fax Service & Reliability at
 (02) 9264 6320
mail Service & Reliability, Australian
 Personal Computer, PO Box
 4088, Sydney NSW 1028.

Please keep your letters to no more than 300 words. All letters must contain a full name, address and contact phone number.

APC reserves the right to edit any submitted material for length and clarity.

We can publish only a selection of letters each month and regret that letters cannot be answered personally.

Computers are endlessly promoted as productivity tools. But are they really the time savers we proclaim them to be?

Our favourite waste of time

The world of business is moving faster and faster and it's increasingly global. Using these digital systems to keep everybody in touch and analyse information in a rich way will be critical to the success of businesses in the future. These systems will use PC technology as a key element."

Those words were spoken by Microsoft CEO Bill Gates at the launch of a partnership between Microsoft and NEC in August this year. Outside of that context, they reflect a very standard view of the PC's place in business: an essential tool offering newer ways of accessing information and more efficient ways of working.

Gates is far from alone in promoting such a view (albeit for purely commercial reasons). The continued growth of the worldwide market for PCs, estimated by Dataquest to be 19% for this year alone, reflects the extent to which it is endorsed by the business community at large. But there is another side to the story. PCs have undeniable benefits in the workplace, but the amount of time they save can be offset to a fair extent by the new problems they introduce.

One recent study highlights just how much time can be wasted by PCs in a corporate environment. SCO, best known for its UnixWare product, commissioned a survey of 400 European corporations to find out how effective their use of technology was. The study concluded that, on average, three weeks of working time per year was lost by every user in an organisation due to problems with computer technology.

The biggest single factor in consuming staff time was the implementation of new systems, which accounted for 2.5 hours per week per employee. On top of this, an extra one hour and 43 minutes per employee per week is consumed during the first month after the installation of new systems as teething problems are sorted out.

Corporate uptake of new operating systems and applications has rarely been as fast as software vendors would like. Microsoft, for instance, has only seen

Where does the time go?

Problems with PCs can consume large amounts of staff time. What are the biggest problems?

- Installation and implementation of new systems — 2.5 hours per employee per week
- Malfunctioning PC, software or network — 1.5 hours per employee per week
- Work systems used for personal tasks — 0.5 hours per employee per week



large-scale corporate take-up of Windows 95 over the past 12 months, but is already encouraging businesses to consider Windows NT 5.0, which hasn't yet been released. These figures suggest that companies are right to be cautious in such moves. "The latest software isn't empowering these users — it is disrupting their working day," said Geoff Seabrook, senior vice-president of SCO's European operations.

The next most common waste of time was PC or network malfunction, which accounted for 1.5 hours of wasted time per employee per week. Surprisingly, personal use of work equipment, which is often viewed as a major problem in large corporations, only accounted for half an hour per employee per week. This may partially be due to a natural tendency for staff to under-report their personal systems usage. It may also be due to the fact that many tools for controlling staff misuse of technology are available, ranging from Web filters through to software distribution control systems that prevent the installation of games or other unauthorised software.

Preventing software and network malfunctions presents something more of a challenge, even though three-quarters of reported problems fall into this category. While PCs have become more stable operating platforms over the decade or so that they have been important business tools, the source of potential problems is still seemingly endless: badly written applications, operating systems that aren't fully tested, damaged

cabling, set-up inconsistencies...

Not surprisingly, 71% of users reported experiencing frustration when their PC fails to function, but many also had more specific complaints. Eleven per cent of respondents identified PC failure as a key frustration within their job, 27% complained of eyestrain caused by PCs, and many held the PC responsible for causing longer working hours. Since,

however, 90% of respondents also saw the PC as an essential tool in their working life, a simple call to down tools seems unlikely.

While the SCO study is one of the first to have specifically focused on how time is wasted on PC maintenance tasks, many previous studies have touched on the problem. Ongoing research by the Gartner Group, for instance, has identified 'buddy help', where staff within an office ask other staff for assistance with PC tasks, rather than calling on support services such as help desks, as a major hidden cost in IT implementations.

Indeed, the importance of establishing effective support systems has been emphasised by many consultants. "Dealing with inquiries and problems quickly and effectively is vital to the success of any organisation," said Duncan Brown, a senior consultant at Ovum Research. "Help desks and customer service systems are a crucial point of contact which companies can use as a competitive advantage."

Despite the problems, it seems clear that PC technology will remain at the centre of corporate practices for the foreseeable future. Tasks like processing millions of transactions per hour are never going to be achieved without the use of such systems — a fact recognised by the 97% of surveyed users who saw PCs as essential to their employer's competitive advantage. However, as we pass into a new year, there's no harm in pausing to remember the other side of the equation.

Angus Kidman

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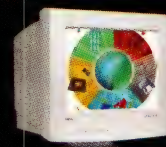
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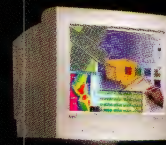
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*Just how effectively are small businesses using networking,
and how is the industry trying to woo them?*

Adding up the figures

Small business is big business in Australia, according to recent figures from the Australian Bureau of Statistics (ABS). The ABS survey of 1995/1996 employment generation found that small businesses were responsible for generating 65% of net jobs created in that time.

A second figure within the survey should give pause for thought to many small businesses, however. The ABS divides firms into two categories — innovators and non-innovators — according to their willingness to adopt innovative business practices and methods. While 30.9% of businesses which were classified as 'non-innovators' reported increasing income over the time frame, 41.8% of businesses categorised as innovative reported increases.

The message from these figures is clear: innovative business practices are one of the more predictable ways of improving income. And the implementation of information technology solutions — be that a single PC to take care of bookkeeping or a network of systems to maintain stock control — is one of the most obvious areas for improvement for many small businesses.

That's not to say that small business has been slow to recognise the potential of IT. A study carried out by International Data Corporation (IDC) in Australia earlier this year found that small businesses spent \$564 million on computing technology in 1996, up from \$519 million in 1995. Those figures gave small business a 22% share of the overall market, with growth rates nearly three times as great as the corporate sector, which had a 23% share. In total, 303,678 PCs were shipped to small businesses across Australia — a substantial market by any measure.

While those figures date from 1996, it is only recently that large software companies have started paying serious attention to the needs of the small business market. This is especially true of the networking sector; while the major competitive battles in this segment have been

over enterprise-level technologies such as directory services and application deployment, the requirements of smaller enterprises have tended to be ignored.

One notable exception has been Artisoft, which has long promoted itself as dedicated to the networking needs of small business. In line with that goal, it has championed peer-to-peer networking, which doesn't require the installation of a separate server.

The company has been going through a fair degree of corporate turmoil recently, with its local office being closed down in August and the company's CEO subsequently resigning in the wake of continued losses. Nonetheless, its LANtastic product is still used by many sites throughout Australia.

However, the fact that Artisoft is now working to make its products interoperate with Microsoft's Windows NT also points to another clear trend: NT is becoming the networking platform of choice within many small businesses.

While the platform achieved that status without much special effort on Microsoft's part, in October the company upped the ante by launching a version of NT specifically aimed at the small business market. Back Office Small Business Server is targeted at small (25 users or less) installations, and includes simplified administration tools.

In announcing the product, Microsoft conceded that some of NT's complexities may have dissuaded small business users from taking up the product: "Before the introduction of BackOffice Small Business Server, complex or incomplete alterna-

tives prevented resellers and IT consultants from recommending and installing the new generation of server applications in small businesses."

Now, if Microsoft gets its way, NT will also soon be the desktop platform of choice, since its plan over the next three years is to phase out Windows 95 (and its successor, Windows 98) in favour of Windows NT. For the moment, Microsoft is continuing to maintain the legacy of Windows 95, which is relevant to small businesses for two reasons. Firstly, the hardware requirements for 95 are less steep than for NT; this may be highly relevant if changing operating system is also going to force you to upgrade your hardware. Secondly, since many small businesses may wish to use their machine in a SOHO environment for entertainment purposes, Windows 95's better support for multimedia and gaming may be a factor.

In promoting NT to the marketplace, though, Microsoft has the added advantage of being a recognisable brand name in the applications space, which can prove comforting to companies which prefer all their systems to come from a single supplier. It even offers a specially configured 'small business' version of Office 97, comprising Word, Excel, Outlook, Publisher, and its Small Business Financial Manager tool. (Both the standard release of Office, and the Small Business version sell for around \$750; the latter doesn't include PowerPoint, so think hard about your needs before you go with it.)

Such perceptual advantages don't mean that the battle is all going Microsoft's way, however. Novell launched a small-business-specific version of IntranetWare in February, called (surprisingly enough) IntranetWare for Small Business, and also targeted at companies with 25 or fewer users. Like Microsoft, Novell sees the product as an entry point to larger sales, since it offers the same feature set as the standard release of IntranetWare and can be easily upgraded to the full product if the business grows.

Angus Kidman

NETWORKING: THE PROS AND CONS

Artisoft	PROS	CONS
	Long experience in small business market Makes best use of legacy hardware	Company in financial strife Peer services native in Windows 3.1/95
Microsoft	PROS	CONS
	NT to become standard platform Tight integration between client, server, applications	Large hardware requirements Small Business Server untested in market
Novell	PROS	CONS
	Strong directory services for easy management Large range of supporting VARs	Technical complexity Fewer specific applications

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Some habits are hard to break.

First

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First

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Last month, Toni Downes looked at patterns of computer ownership in Australia. She continues her analysis this month by looking at how computers are used in the home.

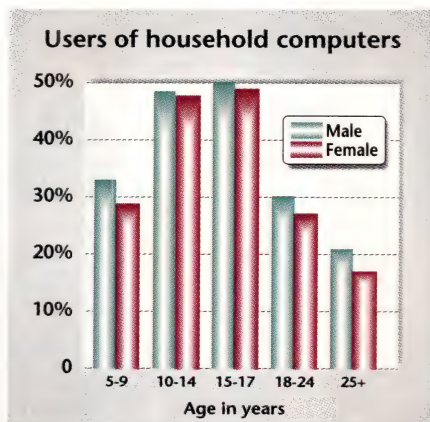
How do kids use PCs?

The three recent major studies into PC use in Australia — those carried out by the Australian Bureau of Statistics (ABS), the Australian Broadcasting Authority (ABA) and myself — found that age and gender play an important part in computer use in the home. The ABS provided the most comprehensive data on the differences across age and gender. It found that the percentage of household members using computers increases through childhood and then decreases for adults over 25. Furthermore, usage peaks for children in upper primary and secondary schools, with 50% of these children using a home computer (see Figure 1).

The study indicated that slightly more younger boys than girls used computers, while in the older age groups the differences were minimal. The gender differences are most obvious in adults over 25. My study explored this issue further, and found that the gender differences were much more pronounced when looking at who in the household was considered the most frequent user. In all age groups, males were much more likely than females to be considered that person.

All three studies found that game-playing, educational or study purposes and work-related activities were the most common types of use of home computers.

The ABS found that in each age group, a greater percentage of males than females used the computer for games, while the converse applied for study-related purposes, although the gender differences



were minimal in the latter case. Men were twice as likely as women to use the computer for business-related activities.

My study confirmed this finding: boys were the serious game players, girls the serious users for school-related activities and men the most likely user of the computer for work activities, though a significant number of women do use the computer at home for a range of activities.

The uses boys and girls made of the computer also varied significantly with age. The ABS study found that the percentage of girls and boys who used computers for games increased then decreased with age. The number of girls playing games peaked in the 10 to 14-year range and then decreased, while the number of boys remained at a peak through 10 to 17 years before declining. Similarly, the percentage of girls and boys who used computers for educational and study-related

purposes increased with age, but both remained at a peak until the end of the secondary school years. After this, the drop-off in use was dramatic.

The ABS study found that, overall, more children used the computer for educational and study-related purposes than for game playing in each age group except for the youngest. These results don't hold, however, if we consider main use cited. When the main use rather than the overall use was analysed, age and gender differences were much more pronounced (see Figure 2).

In general, these graphs reveal that a greater percentage of boys reported their main use as game playing. In the younger age group nearly five times as many boys had game playing as their main activity. In fact, only 5% of these younger boys had educational activity as their main use.

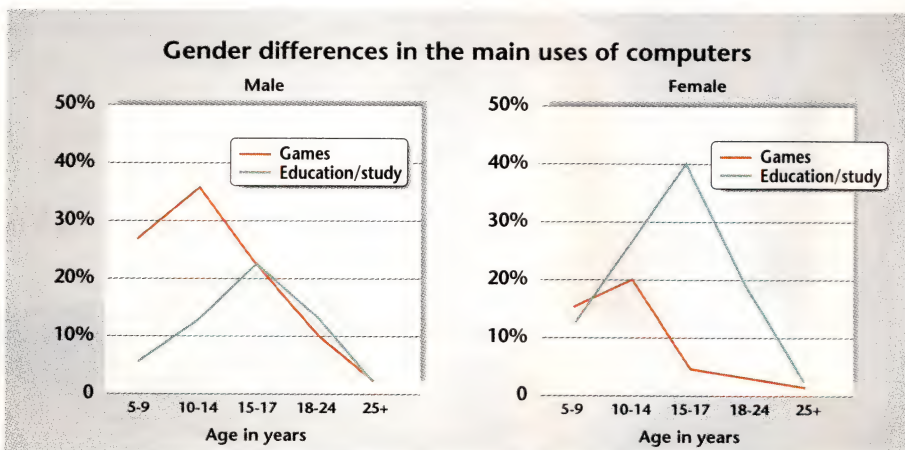
In the middle school years the gap increased further, even though a greater number of boys mainly used the computer for education. It is interesting to note that my study revealed that this is also the age where boys' game playing on dedicated games machines such as Sega and Nintendo was also at a very high level. By the late secondary school years the gap between the two types of main activity disappeared.

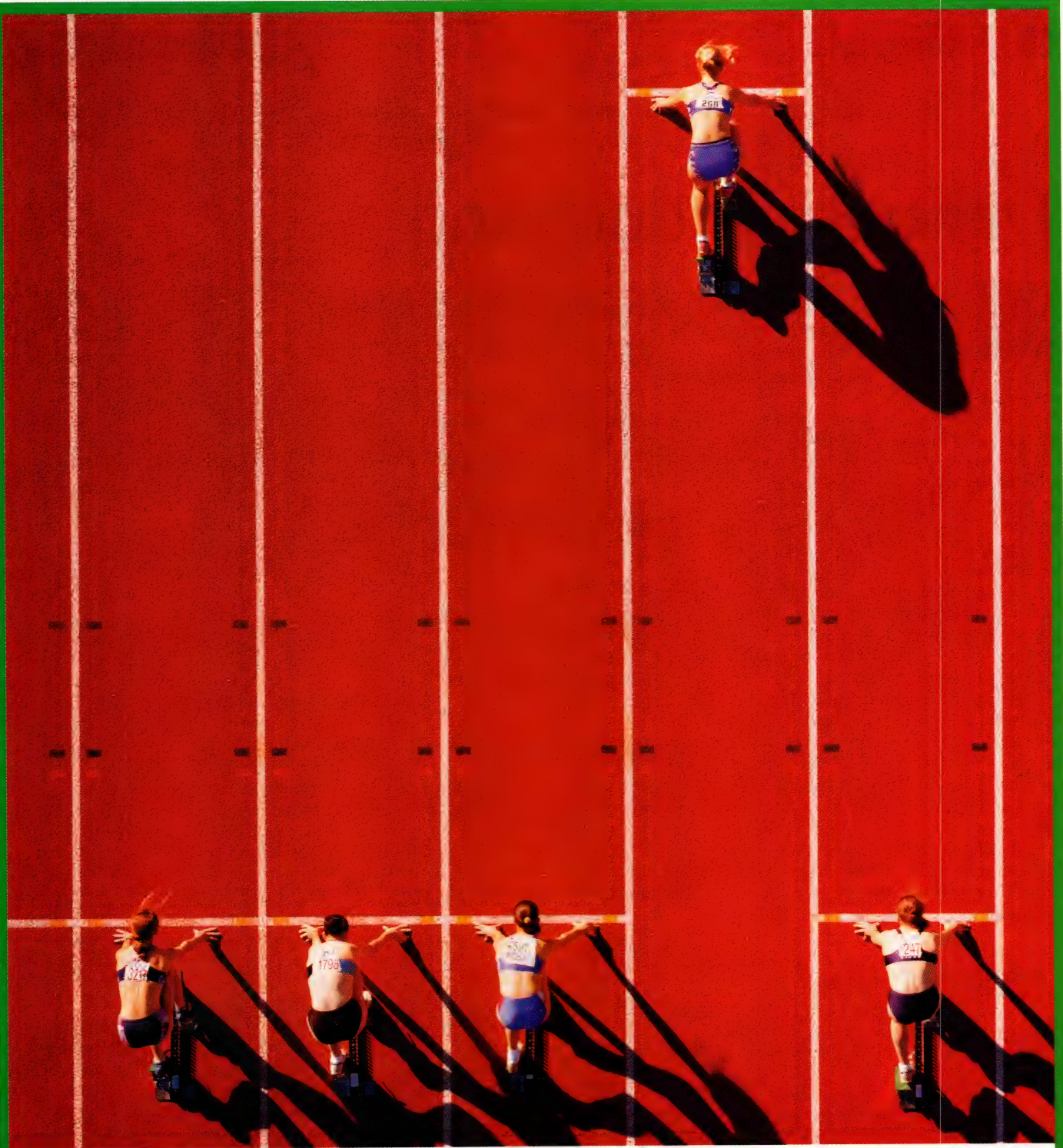
A different pattern emerged for the girls. A greater percentage of girls in all age groups, apart from the youngest group, had educational uses as their main use of the computer. Again, the percentage using the computer mainly in this way increased with age, peaking at 15 to 17 years of age. The numbers mainly playing games peaked earlier, and did so at a much lower level than educational use.

These results should be comforting in that they confirm that a large proportion of children use computers for educational purposes. It is not surprising that such use builds up over the years of schooling. However, for many boys in particular, game-playing activity eclipses educational use until the final years of secondary school.

Toni Downes

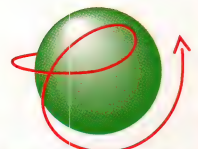
Toni Downes is Associate Dean at the University of Western Sydney, Macarthur.





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Recently, a contingent of protesters boarded an Australian ship docked in Hong Kong, attempting to stop it dumping its load of hazardous waste. What was on board? Computer hardware.

Dangerous dumping

The exponential rise in the use of information technology, and the constant grab for 'bigger and better', is helping to create a mass of unwanted computer systems and peripherals.

Instead of encouraging manufacturers to create long-life, upgradable, recyclable products, a common way of dealing with the problem of disposal is to export it to less developed countries, many of which are not properly equipped to process or dispose of it. Global environmental issues campaigner Greenpeace says that while governments of developing nations may make money from importing such waste, there is too much damage caused to both workers' health and the environment.

Greenpeace has been monitoring toxic waste trade for about 10 years, and a spokesperson said Australia was one of the major waste exporters in the Asia region. In 1996, Australia exported about 8,500 tonnes of hazardous waste to Asian countries, most frequently China, Indonesia and the Philippines. No figures were available on how much of this was generated from IT equipment. Nor are there figures available on just how much computer

Hazardous waste in computers

- Computer circuit boards containing heavy metals like lead and cadmium
- Computer batteries containing cadmium
- Cathode ray tubes with lead oxide and barium
- Brominated flame retardants used on printed circuit boards, cables and plastic casing
- Polyvinyl chloride (PVC) coated copper cables and plastic computer casings that release highly toxic dioxins and furans when burned to recover valuable metals
- Mercury switches
- Polychlorinated biphenyls (PCBs) present in older capacitors and transformers

Source: 'Techno junk — the hazardous waste of the information age', Greenpeace

waste actually stays in the country, ending up in landfill.

"This is not a well-studied waste stream, but it is a significant waste stream," said Matt Ruchel, a Greenpeace Toxics campaigner. "And it is one that contains significant resources. There is no infrastructure set up to deal with that."

This concern was outlined earlier this year by the National Centre for Design at RMIT (see APC, February 1997, page 17). It said that Australia was lagging behind in the development of waste minimisation strategies.

Greenpeace protesters from China and Australia occupied the freighter Zim Sydney in September, and demanded that its three containers of hazardous computer waste en route to China be returned to Australia. Ruchel said the waste was being exported illegally.

The world community adopted the Basel Convention on the Transboundary Movement of Hazardous Waste for Final Disposal in 1989, aiming to stop the dumping of hazardous waste in developing nations. Five years later, the 60 parties of the Basel Convention agreed to an immediate ban on exporting waste to

non-OECD countries. There is still, however, a loophole which allows the transportation of hazardous material to these countries for recovery operations. Under Australian legislation, an export permit is required. (The Zim Sydney had no permit, according to Greenpeace.) The Basel Ban, which comes into effect on January 1, 1998, will close this loophole, but Australia has been lobbying Asian governments to set up bilateral trade agreements to continue the export of waste.

Old computers aren't easily recycled, and it takes intensive labour to recover small percentages of valuable metals, said Ruchel. Once exported to non-OECD countries, where labour is

abundant and cheap, and work safety and health conditions are minimal, the hazardous components are separated from the recyclables. "In developing countries it is more likely that components like circuit boards and PVC-coated cables will be burned to recover valuable metals," said Ruchel. "This releases many hazardous constituents, which can then impact on both the worker's health and the environment." The electronic scrap sent to landfill also leaches into waterways and surrounding land.

"The notion that EEPs [electrical and electronic products] could contain substances that are toxic or hazardous is yet to be widely recognised in Australia, let alone acted upon," said the National Centre for Design report. Computers were noted as being of particular concern. "Because the landfilling process takes so long and is quite complex, the exact impact of hazardous wastes contained in discarded EEPs is relatively unknown."

It is not enough to simply ban the export of hazardous waste. This often just means the scrap gets pushed into another waste stream, such as landfill. A better solution is for governments to adopt a policy of product takeback, so manufacturers need to deal with the scrap (see APC August, page 72).

Selina Mitchell

Effects of chemicals

- Lead can affect the central nervous system, kidneys and reproductive system, and has been strongly associated with impaired neurobehavioural development.
- Cadmium can cause irritation as well as corrosion of the respiratory tract. Longer term impacts include kidney dysfunction and carcinogenic infection.
- Exposure to high levels of mercury can cause kidney damage, nervous system defects, nausea and diarrhoea. Repeated exposure can result in permanent damage to the brain and kidneys, and to growing fetuses.
- Barium causes irritation to the eyes, nose, throat and lungs. High exposure can lead to death.
- Dioxins, arguably the most poisonous substances on earth, have been linked to cancer, and immune and reproductive system interference.
- PCBs, banned in many countries, can cause skin complaints and damage to the nervous, reproductive and immune systems.

Source: Greenpeace

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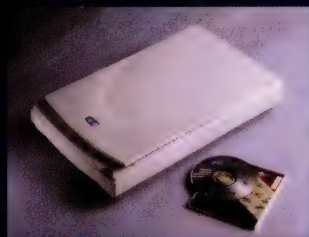
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PRIMAX

In another life, Sun Microsystems might have been an Australian company. APC talks to technologist Vaughan Pratt and finds out why that never happened. By Dan Tebbutt

An Australian odyssey

V Vaughan Pratt is among the most renowned Australian computer scientists. But, like so many compatriots, it was in the US that Pratt found his niche. Pratt was an instrumental figure in the early days of Sun Microsystems, but his enduring love remains research.

A comfortable home in Silicon Valley's picturesque Los Altos Hills is evidence enough of the success he helped foster at Sun. Pratt's experience in Silicon Valley is

were a radical idea. MIT conducted considerable work in this area but eventually encountered opposition, rather than the expected support, from Boston-area companies like Digital Equipment, which maintained time-sharing systems were more economical. While the original SUN terminal was intended as a graphics interface for the university network, it soon became clear that a wholly different opportunity existed for Unix-based workstations. Pratt said the project had a strong

anybody doing it. That was why I started in the low-level guts of the system. As the whole enterprise picked up momentum we were able to get in people for whom this was their first love. I was very happy to move onto my first love, which is more theoretical things," he said. From 1985 to 1987 Pratt continued in a consulting role with the growing company.

Research roots

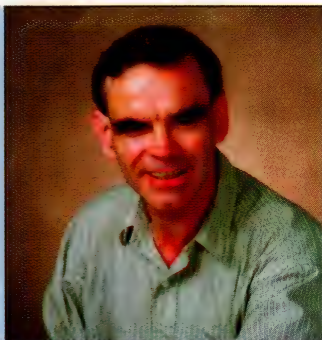
Younger people today take computers for granted, but not so long ago computers were confined to academics and highly trained professionals. Pratt was among his generation's computer-literate elite. He began studying computer science theory in 1964, and earned his PhD at Stanford in 1972 before taking a post at MIT. His work mixes advanced theorising together with more accessible efforts.

His graphics and curve rendering work, for example, will lead to better digitising of fonts. Pratt said typography is no longer a problem for Latin-based languages with multitudes of aesthetic fonts, but it remains a limitation for languages where alphabet digitisations are less plentiful. His research could eventually lead to cheap and easy fonts for all scripts.

Further out there is the professor's ground-breaking exploration of event-driven parallel computing. Most computer systems today derive from the Turing model that relies on sequential processing based on state settings. But, Pratt explained, if you look at a computer, most parts of the system operate in parallel, except for the linear processing required at the CPU. This parallelism is even more pronounced on computer networks. Pratt is developing a process specification language that will allow computers to act according to abstract events rather than a specific state. In the 1970s he invented a dynamic logic model based on state information, and last decade made this dynamic logic event oriented; his current work aims to balance the two aspects.

Ramifications of this approach are particularly profound for distributed systems, because "widely spaced but almost simultaneous events are not adequately modelled in traditional, purely state-based

"Silicon Valley proves that technologists are every bit as important as management. You need both elements to succeed."



indeed impressive, and while he admitted his knowledge of the Australian IT scene is not entirely current, APC found his perspective informative and sagacious.

Living the Silicon Valley dream

Sun represents one of the biggest startup success stories in the history of Silicon Valley. Begun in 1982 by four ambitious students, Sun has now grown into a booming \$US8.6 billion company employing nearly 20,000 people in 41 countries. Pratt was involved in the project from the earliest days: while on sabbatical from his regular academic post at Massachusetts Institute of Technology (MIT), he coordinated a project developing a workstation for the Stanford University Network (SUN) in August 1981. While Andy Bechtolsheim (later a Sun founder and Gigabit Ethernet pioneer) developed a hardware design for the workstation, Pratt ironed out operating system software based on AT&T Unix. Soon after Pratt found himself in charge of the SUN workstation project and accepted a full-time post at Stanford.

At the time, dedicated workstations

vision of the network from the beginning, even though basic technology like file sharing was not even available until NFS appeared in 1983.

Pratt faced a critical decision in February 1982 when Scott McNealy, Vinod Khosla and Bechtolsheim wanted to form a company to build Unix workstations based on the SUN prototype. They invited the academic to become a founder or employee, but Pratt chose the more stable university career path. The trio recruited Bill Joy, then reputed to be the region's best Unix engineer after creating the BSD operating system at Berkeley, while Pratt took on a consulting role with the young company.

Eventually, from April 1983 to April 1985, Pratt did take a position with Sun, working on graphics. He developed Pixrect, a frame buffer programming abstraction that allowed the company to upgrade graphics systems without breaking third-party applications, as had happened previously. Pratt designed Sun's corporate logo as well.

Pratt spent an increasing amount of time investigating curve theories and fast drawing routines. "When Sun started it was clear what we needed and there wasn't

models of computation," Pratt said. Giving greater emphasis to events could lead to much more efficient multiprocessing on distributed systems and allows computers to operate independently and asynchronously, and to later become synchronised. Pratt foresees applications for the transport and manufacturing industries as well as for the military. "It applies to anything that moves or has a lot of parallelism," he said.

"It's almost a tautology to say that you get more efficiency with concurrency," said Pratt. "Parallelism is just a part of life." He argued that computer theorists and programmers tend to think sequentially and don't consider the avenues for scalability. Networking increases the potential for benefiting from scalable distributed systems, Pratt believes, especially now that the Internet is putting unprecedented networking power into the hands of everyday computer users.

Explaining the Silicon Valley phenomenon

APC asked Pratt if anything in his unique perspective on Valley life could explain its phenomenal startup boom. "When I started, Silicon Valley already had 10 or 20 years of momentum, depending on

research park tradition of Silicon Valley that dates back to Hewlett-Packard in the 1950s. Other initiatives like the fabled Xerox Palo Alto Research Center (PARC) were modelled on the HP experience and provided a blueprint for today's research incubators.

Choice of technology also played an important role. HP's booming technical instrument business and a concentration of early semiconductor and integrated circuit pioneers like Fairchild, Intel and National Semiconductor put Silicon Valley in just the right place and time for a historic boom. Texas today has similar strength in chips with Motorola and Texas Instruments, but Pratt pointed out that industry there is more dispersed between Austin, Houston and Dallas.

Even on the software side, Silicon Valley has a good record of picking winning technologies that each spawn dozens of startups. Sun's realised ambition to become the leader in Unix workstations distilled massive software expertise throughout the region, although Pratt pointed out that this occurred later than the semiconductor revolution. Apple, Oracle and latterly Netscape have made similar impact in other software fields. "Silicon Valley is just a nice blend of hardware and

raise questions in Pratt's mind. "IT and computing can be done anywhere, but the problem is that aggressive people are going to want to go to the US or Europe where there's a critical mass. In Australia finding a critical mass for any enterprise is difficult." While that's a problem not easily solved (even triple the population would be a small domestic market compared to the US or India), Pratt suggested the Australian government could assist with selective immigration offers aimed at building enterprises. Work permits are relatively easy to obtain in California's high-tech industry, which allows Silicon Valley to scoop the cream of the crop. He pointed out that key visionaries behind Sun were born overseas.

Pratt does not believe there's a simple Silicon Valley formula that Australia can adopt. "We got there first," he said with a grin. "You have to make your own formula." He agreed that specialised venture capital skills in the Valley help improve the likelihood of picking winners. "Just like in medicine, specialisation can't hurt — but you may need to get a general practitioner venture capitalist to begin with in Australia."

Original vision comes from technologists, Pratt pointed out. Cases where those technology visionaries are also brilliant managers, such as Intel's Andy Grove or Microsoft's Bill Gates, are an "unbeatable combination". He said Sun has good collaboration between technical and managerial vision, but there it's shared among several people rather than within the one brain. "That's the one shortcoming of Sun."

A strong interface between technology ideas and business sense is critical for startup success, Pratt believes: "If both are in the same head it can lead to the creation of a Microsoft or an Intel."

Pratt foresees considerable opportunities for Australian IT visionaries, but he warned that the competition is tough, and "you can't legislate it to happen". In fact, Pratt argues that even though Californian tax structures have at times encouraged businesses to leave the state, this has done little to slow the boom. Nevertheless, he encourages helpful government action. "If they get wind of an idea, the government could help by identifying useful people and particularly expatriates and could lure them back."

Indeed, perhaps we should lure back role models like Professor Pratt — except that the Silicon Valley dream has treated him so well for so long. ■

"IT and computing can be done anywhere, but the problem is that aggressive people are going to want to go to the US or Europe where there's a critical mass. In Australia finding a critical mass for any enterprise is difficult."

how you count it," he said. At the time, however, it had an East Coast counterpart in the form of Route 128, a ring road around Boston that housed the major forces of the minicomputer industry, including DEC, Prime and Wang. "That was an old button-down school and it was very serious. To them California did not make sense because it was so relaxed, but that's a style that still works out today."

The casual culture of dress and attitude generates a comfortable environment where tech-heads thrive. "Silicon Valley proves that technologists are every bit as important as management," he said. "You need both elements to succeed."

A second factor in Pratt's mind is the


software and other levels of innovation," said Pratt. "It's almost too perfect."

How Australia could succeed

There are opportunities for Australia in "software and the Web — anything that's virtual", Pratt said. "Australia is well connected information-wise, so with the Web shifting economic value even further in the direction of software, Australia is just as well positioned as anybody else." Still, selling across the Web can never be the sole channel, he argued, because it misses at least half the market that prefers to deal face to face.

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What does it take to bring a good idea to market in Australia? Is it, as University of Sydney academic Judy Kay suggests, a case of "If you want to sell into the US, you've got to have an American accent; if you want to sell into the Australian market, you've got to have an American accent"? Is there truly something inhibiting about the Australian psyche; or is it a case of market economics?

The answer to all three questions is simply: yes.

Show me the money:

Funding the future

A 'bigger is better' mentality pervades US business and encourages the nurturing of new ideas. The US's larger population and greater concentration of wealth lends itself to largesse, whether it's in terms of an expected return or a benevolent gesture. From An Wang (who

came from China as an impoverished student, honed his craft in the US and founded the Wang systems and software empire) onwards, there has been a recognition that there is sense and balance in giving back to an industry from which one has profited.

As Dan Tebbutt reports in this feature, in Silicon Valley and beyond there's diversity in benevolent opportunism.

There's resonance in the words of Niels Bohr for anyone who has tried to start a new venture in Australia. If you have an idea that is easy to articulate and for which it is simple to garner market enthusiasm, or calculate a return on investment, then it's dead in the water. The easily grasped idea probably represents the too familiar, and is thus not enough of a market opportunity. But

towards government responsibility for the creation of an information infrastructure. Lately, much documentation has contributed to the creation of an ideas-nurturing environment and there have been dire warnings for the future if we don't manage to get there.

Roger Allen, co-founder of Allen and Buckeridge, a funding and management resource for IT startups, is adamant that since Australia lacks both the concentration of serious individual investors and the established venture capital environment, we must look to a different source to make the equation work both ways: superannuation funds. Allen was one of the authors of a report to the Information Industries Taskforce earlier this year entitled *Spectator or Serious Player? Competitiveness of Australia's Information Industries*.

Superannuation represents the sort of capital investment funds that Australian IT needs to tap into to kick-start a dynamic industry, he told APC, because it is "patient money".

Allen, the longtime CEO of Computer Power, said that a clear recognition that the lack of the usual channels of capital was a major problem, together with a feeling that he should, and could, be putting something into the industry from which he had benefited considerably, was what led him to join with Roger Buckeridge in founding Allen and Buckeridge.

"Fundamentally, the view I took is that you've got to tap Australian institution money. If you look at venture capital in the US, and in other parts of the world, the bulk of the money comes from pension funds, and that's appropriate, because it also has to be a small portion of the total assets that you've got under management. In the

On the way up By Helen Dancer

how do you attract funding for something untried and inexplicable? Is the answer to head for Silicon Valley?

While the Valley is a heterogeneous hive of innovation and dollars to match, the technology frenzy occurring in Redmond is a satellite of the world's largest software com-

pany, Microsoft. Homogenous or heterogeneous, the fact remains that the US has achieved something we are yet to see in this country: critical mass.

This can be seen in the concentration of good ideas being funded, the large numbers of companies and individuals willing to provide the funding to take those ideas to commercial development, and the existence of a single location where these good ideas might congregate to attract capital investors with an eye for the main chance.

Australians are equally aware of technology trends as any culture in Europe or America. In fact, in many ways we are far ahead of the curve, but to no substantial avail. Yet.

In the past six months, however, there's been the first foam of a sea change. The words 'Australian venture capital' are creeping into the lexicon as more than an oxymoron. There's the beginning of a shift in attitude

US it is typically about 5% to 7% that a super fund or venture fund would have in this area of what's generally known as private equities."

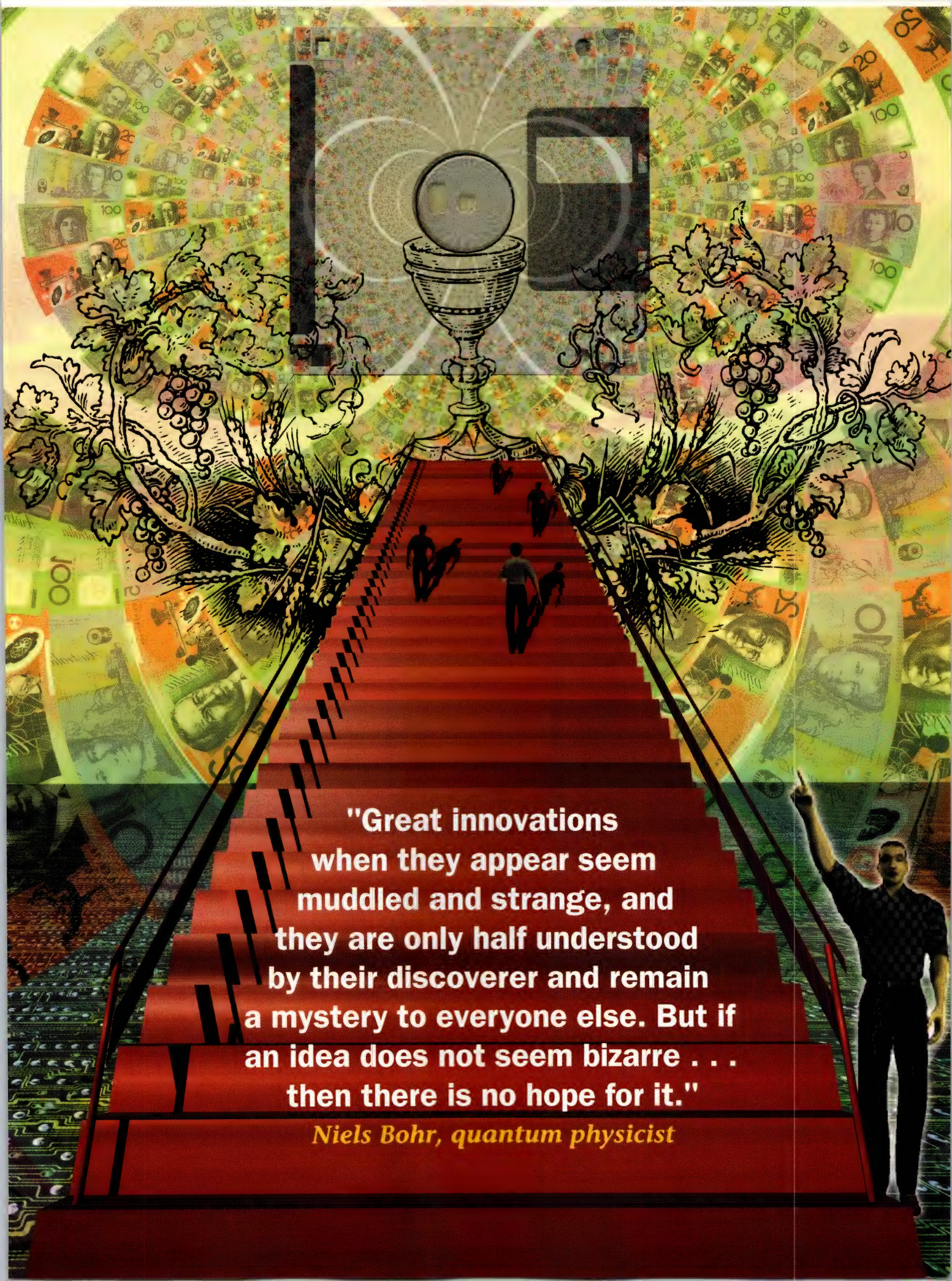
Such investors are 'hard heads', Allen said. "They are dealing with people's superannuation money, so that's the kind of person you'd want them to be."

Asset allocation in super funds management is arranged on the basis of research into returns, and is split between Australian publicly listed equities, international equities, property and fixed interest assets, such as bonds.

The fifth class, which in the US is called 'alternative assets' or private equities, is the private investments sector which Allen estimates represents the 5% to 7% of the funds' asset allocation. Venture capital is one of the subclasses or options for this portion of funds.

Infrastructure is a big competitor for money from this portion in Australia, he said, with the appeal of tollways and the privatisation of airports winning out against the notion of investing in start-up IT&T ventures. "The AMPs and others of this world put money into those sorts of ventures. There's no guarantee, but there has been a government incentive, effectively, through infrastructure bonds.

You can view the huge full version on apcmag.com



**"Great innovations
when they appear seem
muddled and strange, and
they are only half understood
by their discoverer and remain
a mystery to everyone else. But if
an idea does not seem bizarre . . .
then there is no hope for it."**

Niels Bohr, quantum physicist



CASE STUDY

Home grown

'Boys' go global

"This year, we're off to Comdex." It's said with a casual grin, but it's easy to tell that for Lou Schillaci, the words are a talisman of the small company's success.

Born in WA, NDG made a splash in Sydney at this year's PC Show, and the 'boys' are now off to make their mark in the big time.

How do you sell the concept of network management tools in a way which makes everybody sit up and take notice?

The answer seems to be: get yourself a Japanese 'manga' comic logo, go for an easy-to-remember naming convention, and take home a fistful of awards at every possible opportunity. Oh, and build the sort of products you'd want to use yourself.

It's a roadmap along which Schillaci has successfully navigated NDG since he joined the group in July last year.

The now familiar EtherBoy, WebBoy, PacketBoy and GeoBoy started off as by-products of a research project at Western Australia's Curtin University of Technology. Craig Farrell and Mike Schulze began researching visual LAN monitoring techniques in 1993, and while the original name, NetMan Development Group, gave way to the company's present name, NDG Software, the company's key developments have all been 'sons of NetMan', and dubbed accordingly.

TechWeb USA magazine dubbed the suite a "network tattletale that monitors URL traffic in real time".

It's heavy techie stuff, but compelling enough to win the company major awards at both the Sydney and Melbourne expos of PC97.

In July 1996, the group was spun off from Curtin University of Technology and formed a free-form entity of five directors, one of whom was from the university. The university was subsequently bought out of the partnership in February 1997 and the company is now wholly owned by the current directors. Soon after the July formation, Schillaci, whose background is in marketing, joined the group and wrote a time line which contained what he considered to be a critical ele-

ment — the release of a Windows 95 version.

It was, he said, a tightly run race, but the success of the version speaks volumes for NDG's prosperity.

In 1997, after the Sydney PC Show success, NDG was deemed 'Born Global' by the Chamber of Commerce, and the company then became one of the beneficiaries of the Government's Export Support Scheme.

The spectrum of NDG's clients for NetBoy to date indicate its capability: the Australian Stock Exchange uses the NetBoy suite for monitoring the Sydney Stock Exchange; other clients include the Massachusetts Institute of Technology in Boston, the United Nations building in New York and the US Under Secretary of Defense, while the Singapore Polytechnic uses NetBoy to teach networking principles.



In August this year, NDG began negotiating with Rikei Corporation of Japan, and murmurs are that an exclusive agreement has been signed to produce a dedicated Japanese version to be delivered by mid-1998.

At the time *APC* spoke to Schillaci, he was working towards another milestone — speaking as an invited guest of *Red Herring Magazine* at November Comdex in Las Vegas. By the time you read this it will be all over, but for him, it's quite evident that the plaudit is the cap on a hell of a good year.

Helen Dancer

There has been prejudice against venture capital in Australia, in that it is not a level playing field, to use the vernacular."

While in the US the allocation into private investment areas is in the region of 7%, in Australia Allen estimates it to be about 1%. And competing for that money are infrastructure projects and late-stage funding such as MBO (management buy-out) funds — those backing an existing division of a company that somebody wants to spin off. MBOs are a reasonably attractive prospect, because by the time the division of the company is ready to be spun off, it has a track record of proven achievement.

The fund Allen and Buckeridge is focused on creating is one which will be specific to the IT&T industry, and will invest in early-stage businesses. Allen believes that some of the best opportunities exist in these latent and early-stage ideas.

There are other cross-industry funds, he said, but these tend to benefit companies which are already much more mature and have reasonable revenues.

"Fundamentally, the risk [of an un-proven idea] is much higher. Venture capital managers have to go to the super funds and try to convince them to invest the money with their particular fund. You're competing for an already scarce amount of money — there's only 1% of funds under management coming into this area. In order for people to invest money in you, they have to be pretty convinced that what you can offer them is a pretty good rate of return."

The rate of return on the stock market is about 10%, he said, which means that a superannuation house could buy an indexed fund, which involves almost no money in terms of management fees, or put the money into government bonds which would attract around 8%. "So why would you put your money into venture capital unless you thought that you could get at least 15% [net per annum], which you'd then have to pay management fees on?"

The fact that it's a specialist field means that the super funds need to hire specialist managers, such as Allen and Buckeridge, which typically takes a management fee of 1% as well as a performance fee. "So you wouldn't normally

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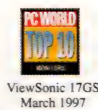
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Dot Pitch	.27 mm	.27 mm	.28 mm	.25 mm
Horizontal Frequency	30-69 KHz	30-69 KHz	30-86 KHz	30-89 KHz
Maximum Resolution	1,280 x 1,024	1,280 x 1,024	1,600 x 1,200	1,600 x 1,200
Optimum Resolution	1,024 x 768	1,024 x 768	1,280 x 1,024	1,024 x 768
Refresh Rate	86 Hz	86 Hz	80 Hz	109 Hz
Macintosh® Compatible	Yes	Yes	Yes	Yes
Windows® 95 Plug & Play+	Yes	Yes	Yes	Yes
On-Screen Control	Yes	Yes	Yes	

What about refresh rates?

Basically the higher the refresh rate the better. Refresh rates relate to how fast a monitor image is painted on screen. A 75 Hz refresh rate (the very minimum recommended rate) means the screen image is repainted 75 times per second. Higher refresh rates eliminate flickers that may cause eye strain. Some-times, this flicker is not even perceptible, but it's there, causing eye fatigue. The ViewSonic G800 provides a phenomenal 80 Hz rate at 1,280 x 1,024 resolution.



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[choose] that [option] unless you thought you could get at least 5% higher than what you could get with not a lot of effort."

The funds managers have therefore got to be aiming to get a return of 20% or better on the money that they have to invest, since there's less net capital to invest after the fees have been taken off the top.

The other self-evident factor is that when you invest in a range of companies, not all of them succeed. That's true of companies both large and small, but at the smaller end of the spectrum, the odds against companies succeeding are higher. "It means you have to be able to get very good returns out of the ones that succeed, because it doesn't matter how good you are, some of the companies you invest in aren't going to make it. Typically (and these figures are more true of the US), out of 10 investments, there are three or four that don't do any good, and you get out of them and probably lose money. There's another four that we call the living dead; they're OK but they don't make a great return, and you hang onto them hoping you can get rid of them. There's typically one, two or three that succeed, of which one may hit a home run, and really do extremely well."

One reason why superannuation funds don't have a track record of investing in this area, Allen believes, is this general lack of conviction that they can make the 20% or more on their investments. Some of the concerns revolve around risk, of which the success of getting your product into world markets is key. Others include the rate of change, whereby even if a company has a good idea today it could be gazumped on that opportunity by tomorrow. There's also the problem of continually shifting ground. "You look at the news today, of Apple's [declining] market share. When people from the outside look at that they say 'Boy, this is a difficult industry'."

Further, there are also the issues of economy of scale, and of getting the product onto the market. However good a product may be, Allen said, distribution is key.

But one of the fundamental hurdles when outsiders look at the prospect of investing in nascent IT products is the perceived lack of sound management practice. "When [investors] look out they see a lot of salesmen but not a lot of good managers. And bear in mind that most companies in Australia are importers of technology. They haven't had the full experience of managing product development, brand name development and marketing. Most of the [people] who work in the multinationals here only really oper-

ate in the sales link. They don't have an all-round general management view of all the things you need to do to put together a successful company. That is an issue.

Even if you go to a company like IBM and try to hire people, they've usually only been exposed to the sales side of the business, whereas a lot of the conflicts you do have are to do with managing issues between R&D and sales, where you put your dollars, how you get your product packaged, how you market and distribute



Bulletin Place is poised for another renaissance.

it, how you build channels, all those sorts of things. Investors see a real shortage of managers and at the end of the day you're backing the manager, or the entrepreneur, more than you're backing the technology. A good entrepreneur will ride out the wave of technology or do a 180° shift if things go badly.

"These are the reasons why there is a lack of money. It's quite rational. The industry often walks up and down and criticises investors for not investing; but really the industry has not done a good job of marketing itself, or there aren't that many success stories that investors can look at and say 'there's a track record'.

"In my view, the ball's in the industry's court. It's up to us in the industry to convince investors."

Draining brains

But here again, the noises coming from the coalface signify that it's a chicken-and-egg scenario. If it's up to industry to convince the backers that capital investment will be rewarded, then we are going to need to fill the gap that currently exists between conception and implementation, whether that's with individual 'buddy partnering' with industry, or the broader

option of developing an infrastructure to support some grace time between the two.

For University of Sydney computing science professionals Judy Kay and Bob Kummerfeld, the situation is a conundrum. Both are developers of acclaimed leading-edge ideas and part owners in some outstanding Australian intellectual property. To this day they continue to work on a range of technologies, notably a push-based multimedia architecture (see 'Pushing the envelope'), but both are adamant

that their primary role is as lecturers and nurturers of Australia's next generations of innovators. Their ideal would be an environment in which they would have time and financial support to prove a concept, take it to fruition, and then hand it on to commercial partners.

"I would rather have a partnership with industry than go out into that field, because a development and advisory role is what I can best contribute," said Kummerfeld. "In any

case, it would be completely counterproductive to the cycle if I were to do that. Australia can't afford to push its academics out into industry."

Juggling both interests necessitates some expensive compromises, however. The recent increased focus on IT as a significant part of every person's future has meant a larger intake of students in the faculty. Increasing numbers of families with teenage students have computers at home — Kummerfeld estimates penetration to be as high as 75% — and these students are deciding that they want computers to be part of their university curriculum. But in the face of the 35% increase in student intake, the department has been hit with a corresponding 20% cut in funding.

It's all happened relatively quickly, said Kay, and the increased intake colliding with the funding cut makes it more and more difficult for the number of teachers to meet the needs of students. "We can't hire more people, and it's even harder to find time for research. If we find time to meet with our postgrads we're doing well," said Kummerfeld.

The obvious difference between IT ventures in Australia and Silicon Valley is that the US does have a history of funding the

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Dot Pitch	.25mm	.25mm
Horizontal Scan Rate	30-115KHz	30-95KHz
Video Input Bandwidth	250MHz	200MHz
Maximum Resolution	1,800 x 1,440 @ 76Hz	1,600 x 1,200 @ 76Hz
Macintosh® Compatible	Yes*	Yes*
Windows® 95 Plug & Play+	Yes	Yes

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ideas of its academics, whereas Australia does not, Kay said.

Professor Vaughan Pratt is an Australian masters graduate who went to the US in the early 1970s and became a PhD. He went on to become a full professor at Stanford University before being one of the five individuals who started Sun (see page 77). Professor Pratt continues to this day as professor at Stanford, but in contrast to his Australian colleagues, has a comfortable lifestyle and a luxurious house in Palo Alto. Would he have been sitting so comfortably had he stayed in Australia and applied that same intellectual property in a local context? Both Kummerfeld and Kay doubt it.

A starkly contrasting example is Kummerfeld's own experience. Together with colleague Piers Lauder, Kummerfeld started Message Handling Systems (MHS) in the early 1990s. They recruited Richard Cousins to provide the business acumen which they felt they lacked as academics. The 'product' was the system which formed the basis for the first ACS Net, the precursor to AARNET, the first academic network. Hardly toy technology.

"I took leave from the university to work on the establishment of the company, and went for the first year without pay. We did the round of the venture capital organisations and basically got zero funding," Kummerfeld told APC. The software, however, has enjoyed considerable success. It was sold to the Department of Foreign Affairs and Trade, which uses it for message traffic between embassies, and also to an insurance broker network which uses it for secure communications.

The university, said Kay, has been 'supportive' throughout the process, although it has not directly funded the project. It has contributed the intellectual property (because Kummerfeld is employed by the university it 'owns' the intellectual property), and in return it retains a portion of equity in the company. Three years ago, said Kummerfeld, the company finally turned a profit, although that's not simply from providing and supporting the software, but also from a range of value-adds.

But, said Kummerfeld, because it took five years to turn a profit, there wasn't the money in the meantime to employ people or market the product — investments which would have turned it into a much larger success. "We took one expensive marketing trip to the US which had a good reception. People thought it was a great



CASE STUDY Home grown

Well before the term 'information overload' had become clichéd, two University of Sydney academics, Bob Kummerfeld and Judy Kay, were working on solving it.

Kummerfeld's background and expertise in networking and Kay's in user interface development — how systems adapt to the user, rather than the other way round — came together in 1994 to work on a push project to manage and deliver high volumes of filtered information to user-customisable profiles.

Kummerfeld and Kay each took a one-year sabbatical to bring the threads of the project together. Since then, both have resumed their lecture duties and concurrently continued work on the project, with lots of input from honours and post-doctoral students.



Kummerfeld sees their development, an architecture for delivering multimedia products, as the future of mass media delivery. His contribution was the delivery protocols, while Kay worked on the models of the user. "At some point you've got to have something deciding what to push," she said.

The goal is to construct agents to filter information using a push technology paradigm, in contrast to the Web, which requires users to 'pull', or actively request each object.

Kay said the word that best describes the system is 'scrutable'. "Obviously, some people won't care what the system is doing and how it's doing it, but others will want a system which can be scrutinised. If you're talking about news, it's evident why you'd want that system to be scrutable, because of the possible agendas. You need to be

Pushing the envelope

able to retain a fair amount of control over who sends what."

The user creates a filter agent which describes both the nature and the priority of information to be received. The 'publication centre' then uses that filter profile to decide whether or not that user wants any given piece of information as it arrives at the publication centre. It uses one strategy for everyday objects, and a different strategy for objects that are large or have a significant commercial value — say a movie. Rather than send the whole movie because it fits the profile, Kummerfeld explained, the filtering system will just send the message that that object is available.

The scrutability factor is also two way. Users can set up very limited access to the details in the personality profile that resides in their publication centre.

Kummerfeld and Kay say the software is distinguished from other nascent examples of push technology on the market, such as PointCast and Marimba. They describe these as "modest steps from pull-media" in terms of the flexibility offered by the user-initiated agents which then select objects on the user's behalf. Their system is designed to be scalable up to thousands of users' agents and to filter thousands of users per day.

The research is particularly important to Australia and for Australians, said Kummerfeld, because of our geographic isolation. "In the long term, our research will support network-based commercial opportunities which are largely independent of geography. Moreover, the push media architecture, making relatively modest network demands, will be important for making effective use of network bandwidth available between Australia and the rest of the world."

Three years is a long time to be pushing a project to completion, especially in such a fast-changing environment, but both Kummerfeld and Kay agree that it's their role as researchers to look towards the long term. "We've got to be looking to the three, five years and further years ahead," Kummerfeld said. "If you're looking at now, you're going to be overtaken by the Netscapes, the companies with massive research resources."

"The project we envisage will be ready to come to fruition when Moore's law and the cost of mass storage catches up with us," Kummerfeld said.

Helen Dancer

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idea, but the enduring question, and a good one, was, 'Well, you're a tiny Australian company. How can you support us?' So in the end, we didn't get the business," he shrugged.

One of the biggest frustrations is the proven longevity of the technology, noted Kay. Although development work on the



Ian Davies: Capital comes at the cost of equity.

system ceased in 1990, it's remarkably current and pertinent today. "If we'd had the funding we could have pushed the idea onto today's systems [into the PC environment]," said Kummerfeld. As it is, the technology remains confined to the VAX and mainframe systems for which it was originally developed.

The upside is that the two have carried forward some of the ideas into the push architecture project they're currently working on (see 'Pushing the envelope', previous page). But even if the push pro-

ject turns out to be the next big thing and attracts abundant funding, it's unlikely the lure of the big commercial world will be enough to induce either one out of the halls of Academe to pursue fortune.

"There's more to being an academic than research. Part of what we're here for is teaching and community service. In any case, academics are not necessarily the right people to fill the business role," Kummerfeld said.

Kummerfeld and Lauder have adopted a one-day-a-week consulting role, which Kummerfeld said offers a good balance for the company, his responsibilities at the university, and for himself.

Both emphasise that academics don't go into this field to make big dollars. The motivation for being an academic lies in a complex balance between discovering things and encouraging the discovery process in others. Furthermore, the expectation that one person can or should be expected to possess or acquire both academic skills and business acumen is absurd, according to Kay. "It would be unreasonable to expect academics to have business skills and the capacity to write business plans. I'd have to take a year out of the time I don't have in order to learn how to write business plans, and really the time would be much better spent doing my development work."

Kay said that in her experience a great deal of the most innovative research and development that Australia has to offer is going unsung, because of the separation between innovation and development skills, and the ability or even desire to tell the world about it (see 'What do you mean, commercial value?' on the Web). "There's also the need to figure out ways of

helping even those people whose ideas don't end up making money, because of the value of the intellectual property that gets created along the way. It will often lead to something else which may evolve into a significant development."

Venture capital ought to be able to provide funding, she opined, and she remains convinced that there's no shortage of talent and ideas. "We have a steady stream of graduates from this faculty going to study in the top US universities. Intellectually we are very well regarded."

Another difficulty in sorting ideas and opportunities is that it's very difficult to judge how good they are. Kay said she regularly sees people dealing with the wrong people. "On the other side of the coin, however, they do say that the best ideas never get offered to the venture capitalists, because of the large chunk of the equity they take in return for a little bit of development money," she said.

Bill and Fred's excellent software adventure

The issue of equity is key for the developer looking at ways of extending a good idea into the realms of commercial potential, according to Ian Davies, the brains behind the award-winning text-retrieval software ISYS. "The thing about capital is that it all comes at the cost of equity. When you're in the shower and you have a good idea, you own 100% of that idea. And the thing that happened to me, and you see it happen a lot of times, is that you lose incredible amounts of equity at a very fast rate, very early on.

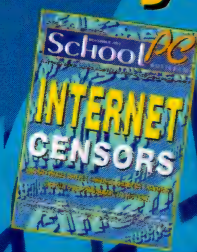
"A classic example is someone being in a pub with their mate and saying, 'Hey,

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I've got an idea.' And because they are in the pub, the guy will effectively give half ownership to his mate — 'You and I can do this Fred. Yeah, let's go into business together. You'n'me. Bill'n'Fred's excellent software company.' So he's given away half his equity on the spot.

"I gave away two thirds of my equity on day one to secure some funding. And I don't regret it, but by golly it goes in all directions, especially in the early stages, a) because you're somewhat enthusiastic to make sure things happen, and b) because it has no value at that point. Two thirds of what?"

Equity, said Davies, is something that can be measured more easily as the company matures than in early stages, and it's the lack of understanding or ability to quantify the value of the opportunity from the outset that, in later stages of market capitalisation, leaves many developers feeling disillusioned and ripped off. And it's a process which, once started, can never be reversed.

Ownership of the idea is one of the aspects that assumes massive importance, Davies said, and developers tend to feel very proprietary not only about the original concept, but about every stage of development and implementation. So it's doubly disillusioning that at the end of the funding process, there's very little left that they can call their own. After two or three rounds of establishment capital, "it's *theirs*, [but] suddenly they find they don't even have a voting majority".

With such an entrenched mutual scepticism, on the part of the investor in the company's ability to provide a return, and on the part of the inventor in the venture capitalist's faithfulness to the cause and not just the bottom line, it's little wonder that the situation in which we find ourselves is so different from the Silicon Valley experience. To secure a place in this future requires that we engender a better balance between the interests of both parties. And, symbolically, some avenues of help might lie within Australia's commercial foundations.

A new infrastructure

Sydney's Bulletin Place, now dwarfed in perspective between tall buildings, was originally Australia's commercial focal point. This birthplace of Sydney commerce also played host in the 1950s and 1960s to the genesis of a now thriving wine export industry. For years, the words Bulletin Place were synonymous with the Len Evans cellars and restaurant which acted

as a hub for wine connoisseurs, vigneron, distributors and exporters. A few steps up the tiny laneway from the now tired-looking cellars is an unassuming old wooden door, which leads, so its building's occupants would like to believe, to the future.

The building is home to the offices of both Allen and Buckeridge, and Helptech.



Lindley Edwards: "A good idea is not necessarily a good business."

Each has a mission to match funding with opportunities, people with people.

The emblematic nature of their location is not lost on Helptech managing director Lindley Edwards, who agrees that what the company is striving for involves a technological renaissance.

We need, as a culture, to experience a renaissance in perspective and in attitude, she told APC, because it's simply our view of our place in the world which is holding us back.

"The problem in this, as in a lot of industries, is that we have to have an export mentality. If you're going to develop a software product that is only going to sell into the domestic market, it will be very hard to compete."

Likewise, we have to change our attitude to risk, and actively support entrepreneurialism, which, she concedes, is a difficult concept to sell after the blatant abuses and excesses of the 1980s.

We're lacking the added impetus that in the US is represented in the sheer amount of competition, she said. To compensate, Australian small and medium-sized enterprises need to develop a solid ability to execute. This consists of four key elements: the vision, the strategy, the implementation, and the necessary modification process.

With this advice comes the warning that to grow a business is not for everyone

and that "a good idea is not necessarily a good business". The difference between ongoing success and failure might lie in understanding what kind of enterprise you want yours to be. "It can be like a yacht, which can manoeuvre according to the wind, when it's small; but a large enterprise becomes like an ocean liner, which takes some time to turn around."

It also takes a bit of a rebel spirit to get into business. "If you believed in the status quo, you wouldn't start a business." What's the point of starting up something new when the way things are suits you fine? Instead, she counselled, the people who are most likely to make a success are those who are engineers of change.

The overriding reason many Australian enterprises have failed to get off the ground has less to do with money than a raft of other factors. "It's a myth that to succeed you need dollars alone. It's not about money but about active assistance." And formula. "It's the essence and cornerstone: the vision and the person and their ability to execute. A person with tenacity will overcome even a better product in the market, and if you are that person you will have the ability to build a good team around you."

Echoing Davies' and Kummerfeld's comments about expertise, Edwards insisted that the person to drive the business forward is not necessarily the one who is tech-obsessed. It's important to consider the idea, she said, not just in the context of how clever it is technologically, but how it translates into a business opportunity. And that includes delivery. She cites the example of Tower Records' impressive 20,000-title offering being swamped by a catalogue service which can offer hundreds of thousands of choices, simply because it is not constrained by the physical limitations of retail space. Such a quantum leap in thinking is key to Australia succeeding in what is a fundamentally global opportunity.

While Helptech's short-term goal is to match people that have good ideas to individual investors and project managers, the long-term game plan involves the establishment of a \$50 million pool of funds, mostly from private investors, from which to fund small and medium-sized enterprises in the IT&T sector.

"A lot of people agree that there is a capital funding gap, but so far there's a lot of lip service and not a lot is happening. It's not an easy sector to work with, but it is a sector that needs support. And from my point of view, VC is strictly project management!"

"It's like the guy who developed quantum theory, who said that all truly great ideas start out by seeming quite bizarre, and end up by everyone saying it's obvious. The process is to make that transition.

"There's a Princeton professor who's an advisor to Bill Clinton, has earned lots of money and likes his lifestyle, but has to make sure some of his money every year goes to people with the energy to start up a business, because he understands that the future prosperity of America is riding on people like that.

"Australia's not there yet, conceptually. And that's what Helptech is about: facilitating the transfer of information and experience."

Einstein, said Edwards, understood the value of heuristics, of the notion that the best way of teaching students is to allow them to discover it for themselves. Edwards believes the notion should be more generally applied to business. "Think about fractals, which are a lesson in looking at the world in a holistic manner. Out of the confusion there is perfect order.

"True innovation comes from the application of something from a different discipline. Look at the world's geniuses, Einstein, da Vinci. Each took multi-disciplinary approaches to their work, their life."

The government's role

The reason for specialising the fund, Allen agreed, exists in this notion of needing to provide rounded business management expertise in equal portion to cash injection.

But the model that Allen and Buckeridge have chosen for their business is the Israeli experience, where full-strength government support has incrementally given way to corporate and private investment.

"A few years ago nobody had ever heard of such a thing as an Israeli software product, but now there are [more than] 70 companies listed on NASDAQ that came out of Israel. There is now a large amount of venture capital pouring into Israel, mainly from America but also from Europe and Asia. Most of the US VCs are now [represented] in Israel and there are a number of investment banks there."

On the issue of the necessary relationship between government support and private money, Allen is unequivocally of the view that government subsidy is not the way, and that such an expectation is both unrealistic and counterproductive.

Initially, he said, the injection in the Israeli IT&T industry was provided by gov-

ernment, but of the last 10 years of steady growth, at least five were driven by investor capital rather than government subsidy. It has been a natural transition, based on the private sector recognition that it was both a vibrant and viable industry, and a good investment opportunity, he said.

He is evidently hoping for a similar evolution in Australia. "Government money funds R&D but provides no added value; no management, no marketing, no experience. There's a technology push, but no-one sitting on the board providing discipline."

Government doesn't have to provide the money, he argues, because there's unprecedented quantities of money in

in 1963, and I've been selling Australian software into the US ever since then."

When he returned from the US in 1995, having grown Computer Power to a \$100-million revenue business and sold it, the temptation to just retire on the proceeds gave way to the desire to "recycle some of that experience".

Allen and Buckeridge is thus founded on the good and the bad experiences of 25 years of being in the business.

"I sat down and thought, what are all the things that I would have loved to have, in terms of support, when I was first going to the States and that could really have helped me?"

The list includes an office in Silicon Valley, and a ready-made mentor programme in the bi-coastal distribution of company directors. Notable among these are George Foster and Graham Taylor. Foster is a professor in the business school at Stanford, who, apart from living right in the centre of the action, actually teaches a course for entrepreneurs in Silicon Valley alongside tech heavyweights Andy Grove (Intel CEO) and Sun's Scott McNealy.

Graham Taylor is a senior partner in one of the Bay Area's largest law firms, also deeply involved in the industry, both from the point of view of venture capital and in the area of initial public offerings (IPOs), mergers and acquisitions.

The networking opportunities offered by Valley-based directors is key to Allen and Buckeridge's formula, said Allen, because of the fundamental need to treat the world as your backyard. Both Allen and Buckeridge are Australians which, he said, gives them a cultural reason to 'go that extra yard' on behalf of Australian companies, yet both are plugged right in to the American system of doing business. The US market is part of the whole market, and the ability to regard the global opportunity is imperative.

The mandate of these directors is not only to leverage their contacts, but to assess the potential for success of any given product, as well as the company's own contribution to that success. "When you're thinking of investing, you're thinking, 'If I do invest in this company, what can I do to help them?'" he said.



The Australian Technology Park: The business incubator.

superannuation funds. We have to demonstrate that IT&T is an industry which deserves professional financial support. Government's most useful function would be in stimulating super funds to consider investing in this area, he said, and in taking some of the money traditionally ploughed into no-value-add R&D and using it to stimulate early-stage venture capital investment.

Made in the US of A

The US is more open to new ideas than it used to be, according to Allen, and gaining distribution there has become somewhat easier. Its denizens acknowledge that they don't have a monopoly on brainstorming. "However, that said, you've got to get your product into the US market, and build a US presence, establish that it does have a market in the US, and that it can compete." Once you've done that, he said, where the product comes from no longer matters.

"A lot of what we're doing is adding a lot of value. I first sold software into the US

It does seem that presence in the Valley can be a determinant of success, both for investors and technology hopefuls. Retriever Communications managing director Mary Brittain-White recently scored a funding coup by securing investment in her small Australian startup from a large Danish investment firm, with the Valley providing the linchpin for both parties. The business, which provides a mobile applications delivery service in vertical markets such as home care nursing from handheld devices, won immediate support from the Copenhagen-based investor, but the deal was sealed in Silicon Valley.

Brittain-White had worked the network in Silicon Valley in a previous incarnation as the managing director of the late lamented RadioMail, and says that the contacts she made first time round were instrumental in securing funding the second time around.

"They're there, you're here. At 12,000 miles' distance they can't manage you, so knowing the company is important," she said.

Also the sheer experience of having done it before was key, she said. A lot of the reason small Australian startups fail is the vast chasm between an understanding of the business world from a corporate point of view and from a startup company point of view. "A lot of people come out of corporate Australia and start up a small venture, and don't understand why it fails. But that's the very reason."

On the differences between attitude on the two coasts, Brittain-White is emphatic. "The IP on which Retriever is based is three years old, so it is proven technology. In the Valley, first-time-round funders will take on a company on the basis of its business plan and the people involved. It's still not the case in Australia; [VCs] want much more proof than a company at that stage can provide."

Building the business incubator

However green the grass may be on the other side, it's important to understand that the business network is alive and well in Australia, through organisations such as the Research Foundation for Information Technology, based around the University of Sydney, and the Australian Technology Park (ATP).

The rationale of the RFIT is to facilitate the collaboration of researchers with possible investors, to at least improve Australia's track record of commercial outcomes on university-derived research.

The aim, according to one of the organisation's leading promoters, Hugh Loewenthal, is to make sure the dialogue between the parties is commenced before the research is completed.

Partnerships between industry and research make a lot of sense from the perspective of the business track record of small startups, according to Professor Rafael Amit, who visited Australia earlier this year at the invitation of the RFIT. Professor Amit is an academic at the University of British Columbia and a principal of a large North American research company specialising in the role of venture capital.

"The failure rate of startups is 85%," he said. "On average, two in 10,000 survive to grow to the stage of employing 100 people, over a period of 10 years."

However, if we don't invest in radically good ideas and small start-up ventures either as standalone ventures or as commercial adoption of successful research, he said, we inevitably fall prey to the lemon theory, which says that the maximum price a buyer is prepared to pay becomes the average price for an average-quality product. As a result, there is no incentive for a superior-quality product to come out onto the market. This in turn allows more lemons onto the market, because the superior product will have been withdrawn from sale.

Lemon-proofing Australia's future are projects like the 'First Release' exposition mounted by the RFIT earlier this year at the ATP, and funded by the NSW Department of Regional Development. Kay and Kummerfeld, among others, presented their push technology project at the exposition, which attracted a wide range of commercially interested organisations and individuals, and, Kummerfeld reported, the results were "very encouraging". He described the ATP as "the kind of place I would have liked to have had access to when we first started looking at commercialising some of the products of our research. It acts as a business incubator; it's a meeting place for people with first and second-stage research and those who have something to offer in terms of nurturing those ideas."

The way out is the way ahead

Up and out is a critical direction for companies looking at going into any kind of business, especially a technology startup, according to Roger Allen.

Brand-new paradigms such as Java and the Internet offer unlimited opportunities for people to jump in, but that doesn't necessarily mean that they will want to

be, or will be capable of, staying the long term. "Larger, more mature companies in Australia face a range of scenarios. They can be sold, go bust, go public, or remain happily doing their own thing. However, a lot of small startups get bought out on the way through. Our help might avoid some of them having to decide by default." It's another argument for getting techos to think like financiers, he said, to increase the number of options available to each business.

However, he also argued, the name of the game is to make money, and being bought out is not altogether a bad thing. "Having an exit strategy is essential," he said, and that's not just from the point of the investor wanting to reap the reward of having backed a winner. "It's also in the interests of the original entrepreneurs. A lot just don't ever think about it. They just start up a venture, and they just go about doing it. They mortgage their house and put all their assets on the line, and they don't get past the notion that they have to get the project working, to the point where they plan their own financial security. "The reality is, you've got to get financial value for all your hard work."

Many of the people APC spoke to for this story wanted to relate the failure of confidence in this country to premature IPOs of companies such as Sausage Software, which went to the market for capital on a business model that is having difficulty proving its sustainability.

The very characteristics that make us Australian also define the nature of the opportunities we have and our ability to exploit them. It is very much a 'geek lottery', in the sense that success or failure depend, not so much on the turn of a wheel, or even on the nature of the technologies on which we tend to focus, but on timing.

If it's true that genius is 1% inspiration and 99% perspiration, then it's axiomatic that we should succeed, since we have both in abundance. The historical lack of an infrastructure to fund and shape new ventures is also changing, borne of the recognition of the value of the opportunity, and our place in a global village.

Silicon Valley still beckons for those who choose that way, but even those who have enjoyed success want to come home. Certainly as developers and players in the new medium, Australians are going to have to go to the world, and not just the US, because that's where the market lies. Its streets may glow with the reflected glory of today's stars, but this doesn't necessarily mean that the Valley is the only highway to success, it's just a different road. ■



he ultimate aspiration runs something like this: work for massive Silicon Valley bulwark, learn the ropes and establish contacts, discover unfulfilled market opportunity, drop out and start company with friends, obtain venture capital funding, list on NASDAQ stock market, count the millions, restart. Every year, thou-

sands of intrepid young workers flock into this region from across the US and around the world chasing this vision of fame and fortune. Whole magazines like *Red Herring*, *Upside* and *Fast Company* now chart the start-up phenomenon. Mike Lin, a nine-year Oracle veteran who last year formed Web con-

Silicon Valley is not for the faint-hearted. Punishing hours, minimal vacation time, hellish freeway commutes, unforgiving bosses and vast, impersonal cube farms are familiar touchstones for anyone working in the surprisingly suburban peninsula

That kind of entrepreneurialism sets the region apart from other centres of business, according to Robert van Goeben, a VC at RedLeaf Venture Management. A veteran of the Hollywood entertainment industry, which he describes as the "antithesis of start-up culture", van Goeben marvels at the way the Valley works. Even senior executives are willing to take and make 'cold calls' to potential partners, an openness that stands in stark contrast to the "button-down mentality" of more established sections of the IT industry.

John Partridge from Accel Partners, which backed Macromedia, Progressive Networks, SCO and Collabra (acquired by Netscape), believes the Valley thrives on the enormous wealth of raw engineering talent in universities. But he points out that other areas such as Boston and Austin, Texas enjoy similar concentrations of colleges; California's historical tolerance of risk may

The geek lottery

By Dan Tebbutt

stretching some 70km south from San Francisco. The upside, of course, is every ambitious young entrepreneur's dream — fast-track promotions according to performance, fat stock options, travel and inconceivable salaries even fresh out of university.

tent management startup Mixer Software with a couple of friends-cum-workmates, has a name for this game: "the geek lottery".

Why Silicon Valley is so good

Silicon Valley's success story is "rooted in history", according to John Walecka, a partner at

Brentwood Venture Capital, which funded such success stories as SynOptics/Wellfleet (now Bay Networks), Sybase, Cirrus Logic and WebTV (purchased by Microsoft). Commercially focused technology research at the region's main universities (Stanford, University of California Berkeley and UC San Francisco) as well as the concentration of semiconductor pioneers like Fairchild, Intel and National Semiconductor created a stunning legacy, according to Walecka. "What you've got today is an incredible set of resources because of the history."

Big companies like Oracle, Intel and Hewlett-Packard nurture a huge pool of technological management talent, but the region is also uniquely well equipped with support services well accustomed to dealing with risky high-tech startups. "On day one you could have access to money, facilities, recruiters, technical people, partners and customers all within five miles," said Walecka. "That's not duplicated in many other places." Australia, in contrast, so lacks awareness about Internet business that even trivial services like banking and renting an office or copier become unnecessarily difficult, according to Tracey Ellery, co-founder of Melbourne startup LookSmart (see 'Australians can LookSmart').

Success breeds success, and Walecka believes the multitude of role models in Silicon Valley creates a culture that inspires other young workers to take a risk.

explain the difference, he suggests. Because most of the principal actors know and trust each other, decisions can move rapidly. "The other reason is that this system has been growing on itself long enough now so that related supporting industries and services have become extremely and efficiently well matched to the entrepreneurial process."

Partridge believes Silicon Valley enjoys a unique "scale advantage". "When you reach a certain density of smart people and related industries, it just becomes inefficient to be anywhere else except where all the ideas are," he said. "If you want to do anything on the Internet and you want to be current, you need to be out here."

Exposure is a critical characteristic that elevates Silicon Valley, said Ted Schlein, a former Symantec executive who oversees the aggressive Java Fund at Kleiner Perkins Caufield Byers. "On a daily basis we here in Silicon Valley are exposed to people, technologies, ideas and trends that you just don't find elsewhere," he said. "If I go to a dinner party, we're going to be talking about technology and trends in the information technology industry. If I spend time with friends on the weekend, that's what we'll talk about. It's a different world — but we've grown up this way." Kleiner Perkins is generally regarded (along with Sequoia) as the region's most prestigious VC firm, owing to a long history that counts Sun, Netscape, America Online, Intuit, Excite, Amazon.com and Ascend among its legendary finds.

Mass and momentum distinguish Silicon Valley, Schlein feels. While other areas have some of the right characteristics, they lack other important elements. Seattle, for example, has a healthy start-up culture — but most exist as satellites to Microsoft. Van Goeben likens Seattle's environment to a "closed circuit", whereas Silicon Valley is very open. He points out that the US north-east is dominated by huge companies like IBM and Digital, while Austin is principally small ventures. Silicon Valley is a happy mixture of giants and nimble startups. "You need both," said van Goeben. "The big companies need the technology and mentality

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of small companies because they can move faster. And the small companies need the big companies' clout and distribution channels." The Texas IT industry is further dispersed between Austin, Dallas (home to Texas Instruments) and Houston (Com-



Ted Schlein believes exposure to technology is key.

paq), observes Vaughan Pratt (see page 77).

The diversity of hardware and software ensures the area is hedged against cyclical downturns, Pratt believes. On top of that, van Goeben said, the tremendous capital in Silicon Valley keeps growing and regenerating in a blooming "reincarnation effect".

How VCs help breed success

Speculative investors are the game show hosts of the geek lottery. Yet VCs insist they are more than cash cows.

"A VC firm is a service firm," Schlein told APC. "Dollars are a very small part of what we do — there's tons of money in the Valley. When you're looking for where to get your money, you really should be looking at what value-added services a venture capital firm is going to bring to the table." Startups should evaluate their own skill base to judge how a prospective VC can fulfil their needs. Schlein said VCs provide important assistance with business strategy, hands-on management supervision, recruitment and introductions to potential partners and clients. Each VC firm tends to vary in the array and style of services it offers.

Besides money, van Goeben said, VCs bring clout and connections — "a Rolodex of partnerships and people" — plus some operational and managerial experience. For Australian startup LookSmart, this

credibility extension was a primary motivation for approaching VCs in Silicon Valley rather than seeking home-grown finance. It's more than a matter of simple dollars.

Risk capital is a VC's primary purpose, Walecka says, but they also bring important experience about what to do and how to avoid the pitfalls. Knowledge of product opportunity and potential competitors can also help steer a young enterprise. Partridge's list starts with money, but he says that a VC's ability to build teams for a new company and establish the right distribution and equity partnerships at the right time is just as critical.

VCs have the right experience to understand the factors involved in operating a new technology venture and compare the risks and rewards, according to Pratt. This means VCs are more likely to predict success because they can pool together more experience than any single management team could amass.

Investor education and awareness of risks is an important element, believes van Goeben. "People realise there is a lot of speculation and a lot of risk, but it isn't as wanton and careless as the speculation in the 1980s. There are a lot of people taking very calculated, very educated risks, both in the private markets and in the public markets. That combination of risk and education makes for a very healthy environment."

Specialisation is also a factor that distinguishes Valley VCs from colleagues operating in other markets. Because the capital market is so competitive, Walecka says VCs have honed down to specialised niches of expertise. In a tight environment, Walecka believes specialisation allows VCs to bring more focused skills into a deal, and that's often a clincher. Partridge claims Accel adopted a targeted philosophy from the start and this helped develop the partnership around specific themes where Accel could claim a better understanding of business models.

Schlein agrees specialisation is helpful, but he says VCs resist being pigeonholed. In future, van Goeben believes, specialisation may become redundant as software continues to blur the lines between tools, content and enterprise software — Netscape offers a classic example. Specialisation may eventually be confined to the hardware/software divide, but even this is changing with software companies like Oracle, Corel and Microsoft getting into NCs and PDAs. Indeed, should the Java platform take off, its abstract representation of the hardware

layer may profoundly change the face of specialisation.

Valley rights and wrongs

Silicon Valley's greatest achievement is stimulating entrepreneurial, out-of-the-square thinking, according to van Goeben. Paul King, president of van Goeben's client Infoscape, agrees. He sees the culture of opportunity that exists in the region as being fuelled by stock options.

Fostering entrepreneurial drive has changed the lifestyle of northern California, according to Schlein. Business values are instilled in companies and even into engineering students at institutions like Stanford. Schlein believes this encourages fast thinkers, fast movers and risk takers. "Entrepreneurialism 10 years ago was not even a category," he said. "Now it's a way of life."

Burnout is the flip side to this edge-walking lifestyle. Walecka sees increasing tension as more and more startups chase any given opportunity. Similarly, companies continually face an undersupply of qualified staff, which sends salaries skyrocketing and employee loyalty plummeting. In addition, Schlein said, the crazy hours and intensity of interaction can blur the lines between social and professional life. "This valley can chew you up," said Schlein.



John Walecka sees burnout as the downside to Valley lifestyle.

Indeed, a more negative take on this phenomenon might regard startups as a Darwinian experiment where intrepid young technologists take all the risks, shielding the larger companies from the expenses of rigorous R&D. Sometimes there's a payoff when a large enterprise acquires the innovative company, but usually rewards to the purchaser will outstrip profits to the creative forces.



CASE STUDY Silicon Valley

Australians can LookSmart

The experience of start-up Internet company LookSmart is sadly representative of the difficulties Australia faces in high-tech business. It began with every intention of operating principally out of Australia, but recently the magnetism of Silicon Valley proved overwhelming.

Formed in late 1995 by husband and wife Evan Thornley and Tracey Ellery, LookSmart is an Internet directory and search service aimed at helping users quickly locate the best of the Web. Combining features similar to the Yahoo catalogue approach, search engines and navigation systems like CNet's Snap, LookSmart delivers a Net interface founded on popular media tastes more than abstract hierarchies.

"We don't believe that people in the real world consume media in the way in which they may consume library research data," explained Ellery, who oversees product development. "We go from a first principles sense of structuring information . . . looking at what are the most popular subjects on the Internet and how we can get people to those in an easy, intuitive way."

LookSmart's directory houses over 250,000 Web references organised into some 12,500 subject categories that are updated daily. The interface uses cascading menus and searching to guide users to relevant content.

The initial database development and editorial work was done in Melbourne, although the focus was always on US and international audiences. CEO Thornley claims developing in Australia helped the company create an objective perspective above partisan geographic nuances.

"It is much easier to get Australians to develop an American product and a UK product than it is to get Americans to develop an Australian product," said Ellery. "For us, editorial development in Australia makes absolute sense."

The content frontier

The origins of LookSmart date back to mid-1995 when the couple was working in New York and experimenting with commercial online services. "One fine day I finally saw the Web live and, like most people, five minutes into that demo I said, 'Wow, this is going to change the world'," Thornley recalled. "It became pretty clear to me that online and narrowband was going to be the

game — and that was by no means the prevailing view, certainly not in the big-money end of the industry. The telcos and broadcast companies were all working on broadband trials that were going nowhere.

"Secondly, it was obvious to us that the public network would triumph over private networks. That was by no means obvious at the time with the dominance of AOL." More online experience began to expose the Internet's limitations, which in turn revealed commercial opportunities. "There were search engines that delivered you a pile of junk. They were very focused on technically literate users," Thornley said. "So we felt there was an opportunity to create a more user-friendly front door to what was undoubtedly going to become the emerging mass market."

The world's worst commute

Developing in Australia was always the plan, especially since the couple wanted to raise their young children in Australia. Unquestionably, Australia has the talent, Thornley says, and attracting staff is easier than in Silicon Valley's mercenary employment market. Furthermore, as an Internet business, the pair believed geography should be irrelevant.

In retrospect, Thornley says, this was somewhat naive, given the importance of US sales and distribution as the company's springboard. He had underestimated the difficulties of dealing with the US market from overseas; in the 15 months LookSmart was headquartered in Melbourne, only once was a phone call returned from the US where there was not already a working relationship.

Thornley found himself on a "horrendous commute" between Melbourne, San Francisco and New York every three or four weeks. In the end it became obvious that US headquarters would be necessary to build the company's presence and partnerships.

Most of LookSmart's executive team now works in San Francisco, stitching up contracts with some success. A number of small and medium-sized regional ISPs have committed to use the LookSmart Network (LSN) as their consumer front end to the Internet, establishing a base of more than half a million subscribers. LSN was first shown publicly at an ISP conference in San Francisco in August, and the company's

Australian arm is currently negotiating distribution deals with local ISPs.

The company's greatest coup to date is its relationship with Netscape. Earlier this year LookSmart signed on as a second-tier partner for Netscape's US search pages; and in September a deal was finalised making the startup a premier search partner in both Australia and the UK.

So why would LookSmart want to enter a market as crowded as search and navigation? "There is a view in the Valley that this game is over. There's been that view for a long time," Thornley said. "In a market that is still growing at 200% compound per annum, my guess is that the game is not quite over yet."

Australian hurdles

Thornley believes financing the business would have been much harder in Australia. LookSmart is currently examining VC options with a view towards eventual public offering, but Thornley said this agenda relates more to the credibility and influence that Silicon Valley VCs bring. "There is no way on earth, I believe, that we would have been likely to finance this business effectively with an Australian entity. The simple reality in Australia is there's no end game. Until there is an end game in terms of a public market that works in Australia, I don't see how Australian entities are going to get financed."

Thornley feels the causes of this situation are complex and will only be solved with strong leadership. "It's got nothing to do with ignorance or lack of commitment on the VC community's part — the VCs are more frustrated than anyone about the lack of liquidity event opportunities."

The experience of Sausage Software is likely to have scared IT entrepreneurs away from Australian listings, according to Thornley. He fears the savage treatment handed to Sausage stems from a lack of understanding about the company's business. "It's not particularly appetising to take a high-risk company into the Australian market and have people kick you in the guts for some of those risks becoming valid — when there's no payoff. Companies in my space on NASDAQ are currently trading at 21 times revenue. You will never see that in Australia with the current public equity market structure."

Dan Tebbutt

Van Goeben, meanwhile, fears that the continuing expansion of massive companies like Oracle and Intel could eventually lead to a more constrictive, concentrated atmosphere akin to the north-east. If this happens, it's conceivable that Silicon Valley could falter in the way the US auto industry stumbled in the 1970s — by losing touch with the realities facing the ultimate users of products. Certainly some Valley characteristics make inbreeding a possibility — the majority of Valley VCs, for instance, are housed in one large, sprawling compound on Sand Hill Road in Menlo Park — but this industry has a remarkable capacity for rapid reinvention.

Still, van Goeben cautions the area to keep its windows open and sniff the breezes outside. "One thing we definitely do wrong is we think that our world is *the* world, that what's exciting here is exciting everywhere," he said. "Not everyone works in the same way as Silicon Valley."

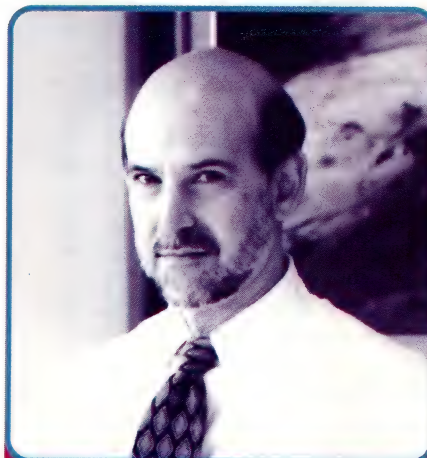
Is there a formula?

Given the rising struggle to capitalise on market opportunities that Walecka identifies, it's worth remembering that the startup game is far from easy. "We realise that as a startup we must have a much more compelling product," Basil Alwan, marketing vice-president at networking startup Rapid-City Communications, told APC. "As a start-up company people are typically not going to do business with you unless the product is compelling. Why would they do business with Rapid-City when they can do business with Cisco?" Reno Marioni, director of product marketing at Infoscience, offers a similar opinion: "As a startup we need to be 50% better to compete with established companies."

So what are the elements that shake out promising startups from the chaff? Every startup is unique, said van Goeben: "The trick is finding that one little twist that is going to make that company successful." Parallels can be drawn, said Schlein, but ultimately the VC needs to understand how each company is different. He added that it's important for VCs to understand what factors they can affect. Schlein's bottom line: "If there's no market, forget it."

A lucrative market opportunity is essential, according to Walecka — and it's even better if the startup can be first to seize the opening. In addition, he said companies must have a world-class architecture plus a core of smart people who know how to sell. "We can't reinvent the product, we can't create a market — but we can help build a management and direct strategy."

It's also desirable for would-be entrepreneurs to give some thought to their ultimate ambition — what's known as exit strategy. Infoscience's King said VCs are always interested in exit strategy. But Walecka cautioned that it's important to be realistic. For example, in a relatively mature niche, new entrants are better served partnering with established players for distribution channels, otherwise capital is needlessly wasted.



Bob Hunt: Austrade is about overcoming obstacles.

"Everybody starts thinking they can build this big business, but that's not the reality of it," said Walecka. "Not everyone can build a big business." His personal priority is to invest in people who can build a fundamentally important company in a new category.

"Exit strategy for us is secondary to building a significant standalone, sustainable business in the \$US100 to \$US200 million range," said Partridge. "If a company is a success as a standalone company then it has exit strategies which include acquisition or IPO. But if you go into an investment with a specific outcome in mind, we feel you can get yourself into trouble by making incorrect short-term decisions for a perceived long-term gain. If you're off the mark, that can get you into trouble."

Pratt feels selling off too early is a "disaster". One of the founding forces behind classic Valley success story Sun Microsystems, Pratt pointed out that Sun never had an exit strategy. It wanted to be number one in Unix workstations and, he said with pride, today it is. Taking a business to the point of public listing means engendering public confidence, which Pratt feels will be a natural progression if the vision is founded on long-term projects.

"The exit strategy ends up taking care of

itself if you look after the fundamentals, which are: is there a market? how big is the market? does this group have a product that addresses that market? and, who are these people?" said Schlein. "If those stars align, the exit strategy will become self-evident." An IPO is preferable because the returns are higher but, he said, acquisition is acceptable when the conditions are right. The best thing about IPOs, offered King, is that they put new wealth into the hands of successful entrepreneurs, and they are likely to reinvest and restart the cycle.

Emulating Silicon Valley?

The big question, from our nation's perspective, is whether there is room to emulate Silicon Valley. Walecka believes opportunities abound, but startups need compelling new technology that addresses an identifiable market need. "If you want to build a really great franchise company, you need to think big — not just about the product, but about how you build a business around the product," he advised.

Kleiner Perkins will look at offshore startups because it's the company's duty, but Schlein feels a Silicon Valley location is helpful because the industry's principal talent pool, technology basis and business support services are housed there. Also, Valley VCs tend to prefer hands-on management participation and that presents obstacles for offshore operations. Foreign ventures also face initial obstacles reaching above the Silicon Valley noise level — one area where Austrade believes it can help (see 'Austrade: First port of call' on the Web). Schlein does not believe there will be another Silicon Valley because it grew through a serendipitous combination of timing, technology and opportunity. Yet he does foresee smaller zones emerging with strong upside potential.

"What has happened in Silicon Valley is very complex, and attempts to replicate Silicon Valley elsewhere in the world have not been successful because Silicon Valley is organic," said Bob Hunt, Australian trade commissioner in San Francisco. "The fortunes made in the personal computer industry created this ecosystem where people and technologies and money circulate. People tend not to remain with a company for long — they join it for the upside potential. If it's successful they take the money and start another company; if it's not successful they lick their wounds then start another company."

"It's like leaping from one rollercoaster to another. That mobility and expectation of reward has no parallel in Australia." ■



CASE STUDY Silicon Valley

Infoscape: The new 49ers

Comparing Silicon Valley to a gold rush is hardly a revelation, but Paul King believes the region's history explains its modern-day entrepreneurial spirit. King is president of Infoscape, one of the hottest among hundreds of budding Java startups in the San Francisco Bay Area.

"If you really trace its origins, there is a culture that was put in place by the gold rush — a culture around opportunity, risk-taking and experimentation," King told APC.

"When Stanford University was formed with that attitude, the environment was conducive to things like starting companies."

Perhaps understanding why the Bay Area outperforms its eastern peers will unlock the secrets of Silicon Valley's exceptional success.

"I don't know if Boston has the same risk-taking, experimental culture that the Bay Area has. Things are more conservative. There's an emphasis on tradition, whereas in California there's an emphasis on change," King offered.

Chasing the Silicon Valley dream

Infoscape was started in February 1995 by King and Richard Williamson, two young veterans of the client/server application movement. The two had worked together for several years at Oracle and Steve Jobs' NeXT Software, where ideas about simplifying client/server database applications percolated inside their heads. "We didn't know exactly what the opportunity was, but it seemed like there was something there," King recalled.

Eventually King and Williamson decided to go into business. To begin with, like many startups, they took on some consulting work, building applications for corporate giants like MCI and Oracle to put money in the bank. Then came the serious part: examining their field of expertise to find a breakthrough opportunity. About this time two new trends were beginning to impact the client/server world: the Internet and Java.

"Java was the missing piece we were looking for," said King. After some experimentation, the duo decided Java offered a chance to fulfil long-held ambitions. "The ideas for the product had been germinat-

ing for years, because we'd been thinking about this area for that long."

What eventually came out earlier this year was a product called Fresco, a development environment for rapidly building and distributing complex, high-end

client/server applications.

Fresco is a certified 100% Pure Java application, which means it can leverage across the myriad different client and server platforms that typically exist in modern enterprises, according to Reno Marioni, Infoscape's director of product marketing.



Infoscape's products allow enterprise developers to create applications by assembling components rather than straight programming which, Marioni said, dramatically cuts development cycles.

Venture capital investors soon approached the pair through social circles. Although King and Williamson were initially planning to 'bootstrap' the venture entirely with their own funds, they saw that VC funding would allow them to hire an engineering team and move faster. After some negotiations, they accepted investment from RedLeaf Venture Management.

Infoscape is now starting to make significant sales, often partnering with larger players like Sun to help deliver a complete solution. Customers include the Excite navigation service, Swiss Bank and several entertainment companies, and deals are typically in the six-figure range. It's a company that sounds ripe for acquisition by Oracle, Sybase, IBM or even Sun because its product could fill in significant gaps.

King's dream, though, is to take Infoscape public, following in the footsteps of legendary IPOs like Netscape and Yahoo. "That's the Silicon Valley success story. That's what drives the whole economy here — that's why people go to work for stock options, that's why people invest."

Attracting venture capital

RedLeaf is particularly attracted to opportunities where it can help shape companies with its experience, according to partner Robert van Goeben. From inception this VC partnership preferred hands-on opportunities where its operational experience could aid start-up investments.

"There's a lot of money out there, but it's the added value that comes with the money that entrepreneurs are looking for," van Goeben suggested.

RedLeaf was immediately attracted to the strong ideas and team at Infoscape when it first met them some 18 months ago. "They [King and Williamson] are smart guys who know their space," van Goeben told APC.

More important still was their idea and the opportunities they created as early innovators using Java to improve dynamic interaction with legacy database services. "The thing that excited us most was the business proposition — the idea [that] this is an enabling technology that enables you to do things that you couldn't do in another way," said van Goeben. "This is kind of a mantra for us."

Infoscape's prescient position put it in front from both technology and marketing perspectives, establishing an early advantage before other players could catch up. "What they are doing is still on the early part of the curve, but a year ago it was space-age stuff," van Goeben said. "That's what we were excited about — the future potential." He believes Infoscape is playing into a key trend in enterprise markets: unlocking the corporate assets of legacy data with easy Web interfaces. "Fresco puts an easy face on data."

While the market chases the startup's position, its VC argues Infoscape can move its solid technology into the sales stage and push forward to develop a channel through partnerships. Van Goeben said the next step may involve another round of finance to enable expansion, either through private VC investment or an equity partnership with a larger company.

Van Goeben applauds King's ambition to build his venture into a company worthy of an IPO. "That is an objective for any company we invest in — or we don't invest," he said. In his view companies that aim to be acquired early on usually have restricted potential. "We never like to look at a company whose exit strategy is acquisition because that really limits the return to us and quite frankly it shows us that the company has a limited potential. We like to look to companies that on paper have unlimited potential."

Dan Tebbutt

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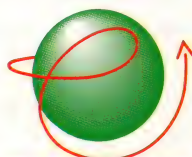
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A sneak peek at what PCs are going to be like next year. By Nathan Taylor and Ashton Mills

The PC of 98

It was more than 20 years ago that Intel's Gordon Moore first proposed what became known as Moore's law, which states that processor and computer speeds will double every 18 months. The proposition has held true so far, and will continue to do so into next year.

Not only will processor speeds continue to increase in the next year, but also design initiatives which have been on the cards for several years will finally come to the fore. Universal Serial Bus (USB), Fire Wire, the PC/TV and DVD will be entering the mainstream next year, with developers finally providing real products rather than the vapourware of the last few years. Also on the cards is a new user interface. Windows 98 and NT 5.0 will be using a new Web-top paradigm for the UI. Apple's Rhapsody is also expected.

PC pricing should be even more compelling than this year. The Gartner Group estimates the price for a PC with a very full feature set (including multimedia components) will be under \$3,000 for major brands. Smaller component assemblers will charge about 35% less than that.

The year of the Pentium II

Next year will be the year that the Pentium processor finally disappears, with Intel ceasing production of the processor and making a real push for the Pentium II, and, later, the processor currently code-named Deschutes. Next year will also mark Intel's move to 100MHz bus speeds and the introduction of Pentium II processor chips for notebooks.

Gartner Group analyst Bruce McCabe believes there is one speed increase on the



Pentium to go before the Pentium II becomes mainstream. He said that the run of the Pentium will cease around March/April, at which point there will be more Pentium II units shipping than Pentium units. Along with a Pentium II processor, most machines will come supplied with 32M, as opposed to the 16M currently used in most systems.

Pentium II will also make its debut in notebooks, although probably not before a 266MHz version of Intel's 'Tillamook' Pentium processor hits the streets. The mobile Pentium II processor is expected to be available to OEMs around midway through next year, and will run at clock speeds of between 233 and 300MHz. McCabe also expects an increase in the use of Intel's Mobile Modules in notebooks next year, which will allow incremental upgrading of notebooks rather than the full system replacement currently required

to upgrade. Although notebook vendors are not too keen on the technology, McCabe believes the market will demand its use.

Back on the desktop, 100MHz bus speeds will appear on motherboards using Intel's yet to be released 440BX chipset (current system buses run at 66MHz). The higher bus speeds will allow Intel to crank up the speed of Pentium II processors to 350, 400 and even 450MHz mid to late next year. In addition to the processor speed advantages provided by a faster system bus, memory bandwidth and access times will be vastly increased, as will PCI, AGP and ISA timings.

The new bus will also bring SDRAM into its own (the BX chipset is expected to support only SDRAM) — on a 66MHz bus, SDRAM is no faster than BEDO (burst EDO), but on a 100MHz bus SDRAM has the edge. Before we see the move to the 100MHz bus, however, Intel is planning to release a 333MHz Pentium II based on the 66MHz bus.

Towards the end of next year, Intel will release its first 'slot 2' (see next page) Deschutes processors. Using the 100MHz bus and the 450NX chipset (which will be released with the Deschutes processor), the new processor will have greater symmetric multiprocessing (SMP) capabilities and faster access to the level 2 cache. Built using a 0.25-micron manufacturing process, Deschutes is expected to debut at 400MHz and increase to 450MHz late next year.

Current Pentium II systems are limited to two-way SMP and, as a result, a signifi-

The Wintel PC 98 specification

Ostensibly, the PC 98 specification is designed to accelerate the uptake of personal computers by providing the most compelling end-user experience. It does, however, strongly favour products developed by and associated with the specification's founders — Microsoft and Intel.

Essentially, it is a detailed specification published by Microsoft and Intel on what a PC released in the next year should look like. Despite the failure of previous versions of the specification to make much of an impact, with most vendors meeting only the most basic specifications, Intel and Microsoft are continuing the scheme, and recently released the latest update. Systems which meet the specification will be allowed to carry the 'Designed for Windows 95' logo on them.

At the heart of the specification is the 'Basic PC 98', around which other forms of PCs are built — these being the Entertainment PC, the Consumer PC and the Office PC.

In the specification, the Entertainment PC has the highest requirements, with required support for just about every PC technology there is. Less demanding are the Consumer PC 98 (which is targeted at the SOHO and basic consumer market) and Office PC 98 specifications.

The specifications are primarily hardware-based, although PC 98 does demand support for certain drivers and add-ons to be included with the computer — namely DirectX and support for Microsoft's NDIS 5.0. It goes without saying that these machines *must* be running 32-bit Windows to meet the requirements of PC98.

Support for OnNow and ACPI in the BIOS is present in all the specifications, and the Office PC also requires a 'manageability baseline' (preferably DMI 2.1) to be supported.

When it comes to bus architectures, the specification demands that USB be supported, with strong recommendations for IEEE 1394 (aka FireWire) — which is actually a requirement for the Entertainment PC — and device bay support. Support for Card-Bus is required in mobile PCs. Microsoft and Intel are also making a strong push to abolish of the ISA bus. Any computer which includes ISA add-on devices will be refused permission to use the logo.

Use of AGP is recommended in both the Consumer PC and Office PC specifications, and is actually required in the Entertainment PC 98 standard, along with high-level hardware support for 3D acceleration. The Consumer and Office PC specs do not demand this kind of hardware support for 3D acceleration, although it is recommended. Television output from graphics devices is also recommended in all three standards.

Modems are required for the PCs targeted at the home market — the Entertainment and Consumer PCs — together with some form of optical media storage. The Consumer PC specification requires a CD-ROM and recommends a DVD-ROM drive. The Entertainment PC specification requires a DVD-ROM drive and hardware MPEG decompression. The Office PC does not require either. High-quality audio is only a requirement of the Entertainment PC, rating only a recommendation in the other two specifications.

Altogether, this entire specification has changed little from last year, although the wide availability of appropriate technologies gives vendors a greater chance of meeting it than ever before.

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For a more complete breakdown of the specification, check out <http://developer.intel.com/design/PC98/index.htm>.

cant number of server systems are still built using the Pentium Pro processor, which supports four-way SMP. The Deschutes processor will be capable of four-way SMP, making it appropriate for use in higher-end servers based on Intel technology. Another benefit of the new processor and cache design will be its ability to access the level 2 cache at its full clock speed (as opposed to the current Pentium II systems, which can only access their level 2 cache at half their clock speed), which is expected to increase per-

formance by about 10%. The Deschutes processor will also be able to handle up to 4G of main memory, and will be available in configurations with more level 2 cache (up to 2M by the end of next year).

Deschutes will use a different slot type (expected to be called 'slot 2') to Pentium II processors and will not fit into current LX and FX motherboards, hence the need for the new NX chipset.

Given its extra multiprocessing capabilities, the faster cache and the capacity to handle more memory, the Deschutes

processor will initially be targeted at server and high-end workstation solutions, leaving the less expensive Pentium II for consumer systems. Intel plans to end supply of Pentium Pro processors when Deschutes is released.

Rumours also abound about some proposed additions to the MMX instruction set late next year. These are neither confirmed nor denied by Intel. The new instructions (called, for the moment, MMX2) are associated with the codename Katmai, and are designed to improve MMX performance in areas in which it was previously lacking — namely 3D performance. Also associated with the Katmai processor is an increase in the size of the level 1 cache of the processor. When, how and if these new features will appear is open to speculation; Intel is not forthcoming with its plans for these enhancements.

Cyrix and AMD will also continue to improve their processors into the next year. Early in 1998 we should expect to see Cyrix's 6x86MX (formerly known as the M2 processor) with support for 100MHz buses and Accelerated Graphics Port (AGP, see next page). Clock speeds for this processor will be improved by the introduction of 266, 300 and 350MHz processors next year.

If all goes to company plan, we will also be seeing Cyrix's next-generation processor near the end of next year. The processor will be manufactured using a 0.25-micron manufacturing process and reach speeds of up to 400MHz. The chip is also said to have additional improvements for processing 3D graphics. Cyrix is also slated to include MMX instructions in its MediaGX processor, used in the Compaq Presario 2200 (see APC October, page 33), early next year.

AMD plans to release its next-generation K7 processor next year, using a 'slot A' module design, which AMD claims will be compatible with the Pentium II's slot 1 motherboard. AMD will also continue to raise its clock speeds; at the recent Microprocessor Forum in San Jose, the CEO of AMD said that clock speeds will go as high as 500MHz, though AMD is not likely to reach that target next year. While AMD is already working on its K8 processor, a 1998 release of that product appears highly unlikely.

Apple will also continue to increase the performance of its computer systems. The 750 processor, currently codenamed Arthur, uses a smaller manufacturing process for lower power and faster clock speeds. According to an Apple spokesperson, Arthur will

start at around 300MHz and scale to 450 to 500MHz by the end of next year. Improvements in the performance of the level 2 cache over previous models and other architectural improvements should give the processor performance levels considerably higher than a 603 processor with an equivalent clock speed. The much-anticipated G4 PowerPC processor could also be released late next year, although details are sketchy. In line with the release of the 750 processor, the 604e processor will be discontinued as of next year, probably peaking at about 400MHz.

New architectures

Perhaps the biggest change you can expect next year is the implementation of a number of new bus architectures. In an attempt to push the PC into its next stage of evolution, new peripheral and interface standards have been designed to increase ease of use and remove performance bottlenecks.

The most notable addition you'll see is AGP, Intel's new interface that allows specifically-designed AGP cards to access main memory at high speeds in order to perform advanced 3D functions.

AGP is basically an extension of the PCI 2.1 specification, taking full advantage of the 66MHz implementation that never materialised in PCI. In its slowest state (known as 1X compliance) this allows the AGP port to push an impressive 266M per second (compared to PCI's 133M). Two more states have been devised to further increase this: '2X' effectively doubles the bandwidth to 533M per second by sending data on both the rising and falling ends of the clock cycle, and the '4X' definition raises this to an impressive 1.07G per second — but this isn't expected to appear until 1999.

AGP-capable cards and motherboards are already available, although don't expect wide support or optimum performance in these teething months.

Developing hand in hand with the implementation of AGP are 3D graphics. Expect nearly every consumer PC shipped next year to have at least some hardware 3D capabilities, most likely from the king of 3D gaming, 3DFX, or its greatest challenger yet, nVidia.

The other architecture you're likely to see is the much talked about, but rarely seen, USB. Also an Intel initiative, USB was expected to become predominant in 1996, but one year later we're only just starting to see a few USB peripherals on the market.

Rather than connecting different

devices to different ports, USB will result in keyboards, printers, mice, joysticks, modems and more all being connected to the one USB bus. Up to 127 devices can be connected through external USB 'hubs', or daisy-chained between each device. On top of this, USB offers a 12Mbps transfer rate and a 5V power line to drive devices that need power, obviating the need to use powerpacks.

Another very useful feature is 'hot-plugging', where devices can be removed or inserted into the USB bus while the PC is active and, with proper driver support, the operating system will be able to recognise and configure the device without hindering the operation of the PC.

USB should eventually replace all cur-

Via a new set of OS-specific and hardware-specific modules, I2O-compliant devices can be used on different operating systems without the need for a traditional device driver to be written. Instead, an I2O device driver simply interfaces with the OS and hardware-specific modules already present. Free of the constraints of platform specifics, the I2O device driver can be easily ported between I2O supporting platforms.

Like FireWire and USB, I2O was expected to take off during 1997, but so far implementations of the technology are few and far between. Initially targeted at the corporate and enterprise markets, I2O is currently being implemented in server-based systems where the technology



The DVD drive will become a standard feature in 1998.

rent peripheral connectors. Like AGP, though, don't expect this new standard to mature quickly — so far the uptake of USB has been very slow.

FireWire is another external bus specification that offers ease of use and increased performance. FireWire is capable of connecting up to 63 devices and supports transfer rates of up to 400Mbps. Like USB, FireWire supports hot-plugging and, like AGP, increased bandwidth is already on the drawing board with plans to implement a massive 1Gbps throughput down the FireWire bus.

Currently, FireWire, due to its isochronous nature, is mainly used for video editing, although storage devices, digital TV and sound hardware will eventually use the technology.

One other new architecture is set to revolutionise computing next year. I2O, otherwise known as 'Intelligent I/O', is an architecture that promises increased I/O throughput, decreased CPU load and the removal of platform-dependent drivers (the I2O architecture is independent of both the device being controlled and the host operating system).

promises to greatly relieve I/O bottlenecks and improve performance.

With the capability to standardise device interfaces to operating systems, I2O will most likely make it to the desktop, although whether it will do so next year is an unanswered question.

New designs

We're finally going to see at least one serious lounge-room PC coming out in the next year. Gateway 2000's Destination PC, which has been a flagship product for the company in the US for the last couple of years, is finally going to be released in Australia midway through next year, according to Gateway. The Destination combines a very large-screen monitor (30in) with a PC and all the multimedia add-ons you could want.

Although Compaq and RCA have released a similar product in the US, it is unclear whether they will be doing the same in Australia.

In another interesting move, this time outside the x86 space, Digital will be targeting a line of Alpha systems at the DTP

and publishing markets, trying to oust Apple from its traditional role. Recent announcements of the availability of QuarkXPress for NT Alpha and Adobe Photoshop for NT Alpha have definitely been a boost for Digital.

In another interesting move, Silicon Graphics is planning to move into the x86 space late next year, releasing Intel-based workstations running Windows NT 5.0. According to an SGI representative, the technology is only now appearing that makes this a viable proposition for SGI — AGP and Windows NT 5.0 are the key factors.

The evolution of storage

DVD should also be popular in the next year, with most of the major OEMs shipping or planning to ship DVD as an option with most consumer PCs. Second-generation DVD kits are already available, and the prices on these kits should go down dramatically as competition increases. In fact, by the end of next year DVD should have almost completely replaced CD in new computers, although the point at which DVD shipments will overtake CD-ROM shipments is a little hard to judge.

One of the current problems with DVDs is that you can only display video on your computer monitor. Most cards for decompressing MPEG2 video streams have jack-to-output, composite PAL or NTSC video. The only problem is that your computer is generally not in the same room as a big-screen TV, and long cables are both annoying and prone to problems with signal quality and audio/video synchronisation. Developers in the US, however, have released products which transmit signals via radio waves between a computer in one room and a TV in another. While these products were initially designed for non-PC applications, they could be an important factor in the uptake of DVD.

DVD-RAM, for all its potential, will be significantly delayed, and we may not see products until very late next year or perhaps not at all. Hitachi, which was planning to release a DVD-RAM drive early next year, has delayed the release of the product pending standards battles between the DVD Forum and breakaway groups.

Elsewhere on the storage front, we should see a conclusion to the battle to replace the floppy. LS 120 drives and media will be widely available and more reasonably priced early next year, and will finally be in a position to challenge the Zip drive as the champion of the low-end removable media space. Will we see an end to floppy

shipments in lieu of Zip or LS 120 drives next year? Probably not (Iomega anticipates this will happen in 1999 or 2000), but these 100M plus storage products will be shipped with an increasing number of computers.

Last, but not least, Gartner Group estimates the average hard disk size for next year will be in the range of 2.5G to 3.5G for mainstream PCs and 3.8G to 6G for high-end PCs. Ultra DMA-33 is also expected to be more widely available.

Displays

Although the trend towards increased screen size is set to continue next year, with 17 and 19in monitors gaining acceptance, 15in screens are still likely to stay standard, according to the Gartner Group. The high cost associated with getting a few



LCD screens will become more widely available.

extra inches is going to stifle the growth of larger monitors. As a result, the smaller monitors will continue to be sold with most mainstream systems.

One development being hinted at by manufacturers of LCD screens for notebooks is the introduction of 15in-plus screens, said Gartner's McCabe. When these products will be introduced has yet to be determined.

Another screen technology to watch is liquid crystal displays (LCDs) for desktops. LCD monitors should start entering the mainstream mid to late next year, and several PC manufacturers will be offering them as an option with new PCs, albeit at a considerably higher price than comparably sized cathode ray tube-based monitors. LCDs should still remain a niche product, but uptake of the technology will almost definitely increase next year.

The OS

Next year will mark the expected debut of no less than four operating systems from Microsoft. The most important of these for PC users are Windows 98, Windows NT Workstation and Windows NT Server (the other is Windows CE 2.0). Internet Explorer's integration in these OSes brings the Web paradigm right to the desktop, with the actual desktop itself being treated as an HTML file. Objects such as Java applets, ActiveX controls and images will be able to be embedded right into the desktop and within directory views.

Microsoft is also banking on Zero Administration for Windows (ZAW) for use in corporations. Essentially, ZAW will cut down on the number of ways an end user can ruin their system. As a user on a corporate network, your operating system may well be restricted to using a single application or a limited group of applications, perhaps even on a NetPC. The only operating systems that the ZAK will run on are 32-bit Windows variants (NT and 95/98).

Speaking of manageability, you can also expect to see increased manageability features built both into the hardware and software of corporate desktops. According to Compaq's product manager for corporate desktops, expect to see more support for things like DMI and ACPI, and the use of features such as serialised ECC DIMMS for more robust operation of the corporate desktop.

All shipments of Windows 3.x will likely cease next year in favour of Windows 98 and Windows NT Version 5.0. Windows NT 5.0 should prove to be popular, particularly given the fact that Microsoft has publicly stated that Windows 98 will be the last iteration of that product line. Windows NT 5.0 also includes the multimedia features of Windows 98 (such as DirectX), ensuring that it will end up on at least a few consumer systems.

Apple's salvation could well rest with the operating system codenamed Rhapsody, which has just been released to developers and should hit store shelves next year. Rhapsody will contain an all-new API for application development (dubbed the Yellow Box) as well as maintaining backward compatibility with existing apps through its 'Blue Box' architecture.

All in all, an exciting year is on the way on both the OS and hardware fronts, with many technologies that have been hinted at for so long finally hitting the mainstream market. It's certainly shaping up to be a vintage year for the PC. ■

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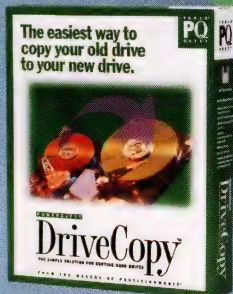
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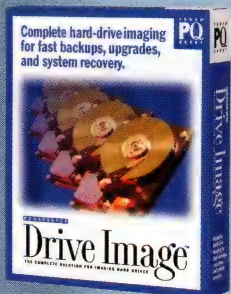


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Will the Distribution and Replication Protocol push us forward to a faster and more flexible Internet? **By Angus Kidman**

Replicating the Web

Push technology has been one of the key Web buzzwords for 1997, and in its basic form is not at all difficult to understand. Rather than going out and seeking information in a live, connected environment (the 'pull' model of the conventional Web), push systems download specified information automatically, either at predetermined intervals, every time the machine is connected to a live network, or during moments when a machine is otherwise idle. Once downloaded, the information is available even if a PC doesn't have a live Internet connection.

Microsoft and Netscape have both incorporated push systems into their latest-release browsers, and stand-alone systems such as PointCast and Marimba's Castanet continue to attract strong followings. This browser focus has meant that 'magazine-style' content has dominated early push developments, with alliances between software vendors and content publishers becoming increasingly popular. Potentially, though, the most useful application of push systems may be in distributing and updating a broad range of corporate information, ranging from employee handbooks through to company announcements and sales documents.

Effective push technology requires more than merely a list of preferred channels and update times, however. Information doesn't necessarily change at the same rate, and some changes aren't best presented in the form of new, discrete documents.

Consider price lists, for instance. If a single price changes in a list containing 10,000 items, then downloading the entire document again is not particularly efficient, even if it can be done without direct user intervention. A better solution would be to simply change the one price within the document itself.

Such an approach can lead to significant bandwidth savings, since only a rela-

tively small amount of information needs to be exchanged. This is especially true when downloading conventional Web pages. The existing hypertext transfer protocol (HTTP 1.1) that is used as the basis for Web content distribution from a server is capable of sending a request to only download a file if it has changed since the site was last accessed. However, each file that has changed requires a separate request, which can slow down overall access times significantly.

A properly configured file delivery system can help to overcome these changes and reduce the number of individual file requests being sent. The trade-off is that the software itself becomes much more complicated, since it needs to keep track of which version of a document has been stored on the local system, compare that to the most recent network version, and then selectively change information so that both versions are identical (a process known as replication).

While many push systems have included replication systems of varying

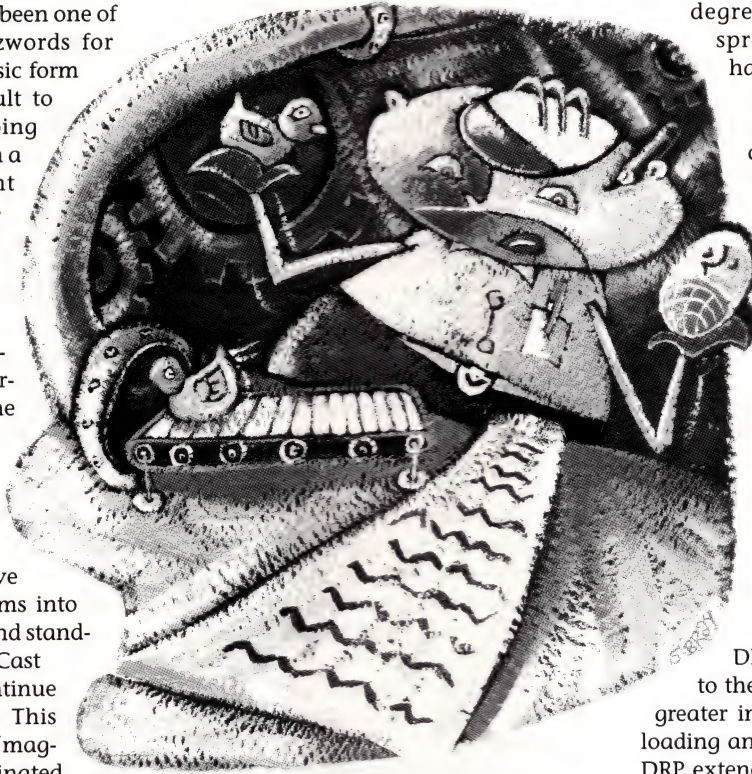
degrees of sophistication, widespread development has been hampered by the fact that each system has taken a different approach. The Distribution and Replication Protocol (DRP), a standard proposed by a consortium including Marimba, Sun, Novell and Netscape, aims to bring a degree of conformity to the process. The standard is based on the Application Distribution Protocol (ADP) model developed by Marimba for its Castanet product, but the company has ceded control of the final standard to the World Wide Web Consortium (W3C).

How DRP works

DRP is designed as an extension to the basic HTTP protocol, giving it greater intelligence to deal with downloading and updating files. In particular, DRP extends HTTP to include a 'differential update' process, enabling it to selectively update content on remote machines without any intervention by the user. A second goal of the specification is to make more effective use of caching (storing frequently-requested information locally to ensure faster access).

DRP still utilises HTTP 1.1 as the main mechanism for serving files; in order to achieve both efficiency and compatibility with a wide range of existing servers. While the initial downloading of a file would not change on an HTTP server equipped with DRP, subsequent updates to that file would call DRP into play as a means of assessing which information to send to a specific machine.

Three basic concepts underlie the DRP model: indexes, content identifiers, and differential identifiers. An index is a list which specifies which versions of which files are available on a machine for a particular application. In the current specification, indexes are written using a specially-designed XML subtype (for a discussion of XML, see APC September, page 113). In the future, the standard may be



extended to incorporate the Resources Description Framework (RDF) currently being developed by the W3C. Index files can either be stored as ordinary text files or generated dynamically by a database or other program.

Using the XML-based structure, a typical index file might look something like this:

```
<index>
<file path = "default.htm" size
= "4321" id =
"urn:md5:xjbGy567sgsgs==" />
<file path = "picture.jpg" size
= "15663" id = "urn:qr35432asdf-
jasjd==" />
<dir path="ticker/data">
<file path="abc.fin" size="112"
id = urn:324875dsgjewiq==" />
</dir>
</index>
```

The INDEX elements identify this as an index segment of the file; each FILE PATH element identifies a particular file to be downloaded as part of this index; the DIR element identifies files stored in a specific subdirectory; and the SIZE element specifies the size of the file.

Versioning (identifying which version of a file is currently stored, and which is being requested) is a critical function for any replication system. DRP handles versioning by using content identifiers, indicated in the above example by the ID element. The content identifier can take any form, but must uniquely identify one version of a file.

To generate the identifier, the DRP specification recommends (although it doesn't mandate) the use of the MD5 checksum developed by RSA Data Security. A checksum is a calculation which is used to verify that the contents of a file have been downloaded accurately. Using the MD5 checksum, the chance of any two different files generating the same identifier is around 1 in 264, which is low enough for most practical applications.

The index file, complete with identifiers, can be downloaded like any other HTTP-accessible file, but once it is parsed by a DRP-aware application, the way in which it is processed changes. By comparing the content identifiers of the files listed in the index with those available on the client, the system can determine which files need to be downloaded. This list can then be sent as a single request, minimising the number of network accesses required and eliminating redundant downloads.

Content identifiers and indexes address

the problems of multiple network requests and the downloading of files which are already present. However, they don't in themselves address the issue of how to minimise the amount of information downloaded when just a small part of a file has changed. DRP handles this by using a concept known as the differential identifier.

When the system sends a request for the latest version of a file (specified by the content identifier in the index), it can also send the content identifier for the version of that file which is currently available locally (this second content identifier becomes known as the differential identifier). Assuming that both files are available on the server, software can be used to generate a diff file, which specifies just the differences between the two files. Once sent to the client, this can be used to create the requested file by combining the diff file with the local version. In the situation where the older version is not available on the server, the request would be handled like any other file access and the complete file would be sent.

Unlike the current content-centric approach of much push software, DRP is designed to be as applicable to software as it is to text, images and figures. As the DRP specification notes: "No assumption is made about the content or type of the files; they are simply files in some hierarchical organisation."

As an added functional fillip, DRP also allows the server to specify multiple locations where files for downloading can be found as part of the HTTP header information it sends out. This means that users in Australia, for instance, can be directed to obtain files from a server in Melbourne, even if the original page is being served from a system in Nevada.

So what comes next?

The benefits of DRP, both to individual end users and to the Net community in general, could be widespread if it becomes widely adopted as a standard. Purely in terms of improved performance through more intelligent use of bandwidth, DRP could offer a better Net experience for the majority of users. However, current indications suggest that DRP will be some time in maturing.

While DRP has been submitted to the W3C, it isn't currently under active consideration as a standard. This is an important distinction; since the W3C is not devoting any resources to considering the standard at this time, there is no guarantee that it

will ever enter the full standards process. However, the DRP standard was one of several topics discussed at a W3C conference on push technology in September, where Marimba presented a paper on DRP and its benefits. Companies which have endorsed the DRP proposal include Fujitsu, PeopleSoft, Sybase, Symantec and Toshiba.

One barrier to DRP's acceptance may be the W3C's belief that many of the features of DRP could be better implemented through other technologies (an issue only partially recognised in the current submission). "Much of the functionality should be able to be provided by the Resource Description Framework [RDF]," the W3C's note on DRP comments. RDF, which in turn is based on the Meta-Content Format originally developed by Apple and others, is currently in active development at the W3C and thus is likely to achieve standardisation much sooner than DRP. Among Marimba's DRP partners, Netscape has already pledged to support RDF.

A more immediate barrier is a lawsuit bought against Marimba by Novadigm, a developer of software management solutions, in March of this year. Novadigm claims that the DRP specification and the earlier ADP model infringe on a patent it holds relating to a technique known as 'fractional differencing', which is used to identify differences between content versions.

"Standards are clearly a positive force in the industry, but the fact remains that this technology is not Marimba's to give away," Albion Fitzgerald, chairperson and chief executive officer of Novadigm, said in a statement the day after the DRP standard was announced. "We think that Marimba's sudden magnanimous decision to abandon their own patent process and donate the technology to open standards should be seen in the light of our already granted patent and the ongoing litigation as an exploitative action without regard to the obvious intellectual property issues involved."

Marimba was equally quick to respond, describing the suit as "baseless and without merit", and saying that the Castanet technology which led to DRP had no relation to Novadigm's patented process. "Lawsuits and allegations like [Novadigm's] are unfortunate in that they slow innovation and are a tactic often used by companies who have otherwise failed to execute effectively in the marketplace and have no other way to compete," Kim Polese, CEO of Marimba, responded. At press time, the lawsuit had not been resolved, leaving at least one cloud hanging over the future of DRP. ■

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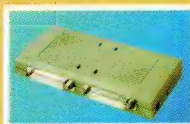
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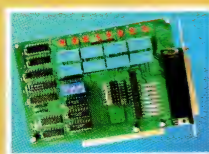
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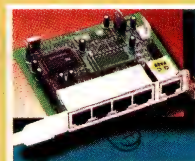
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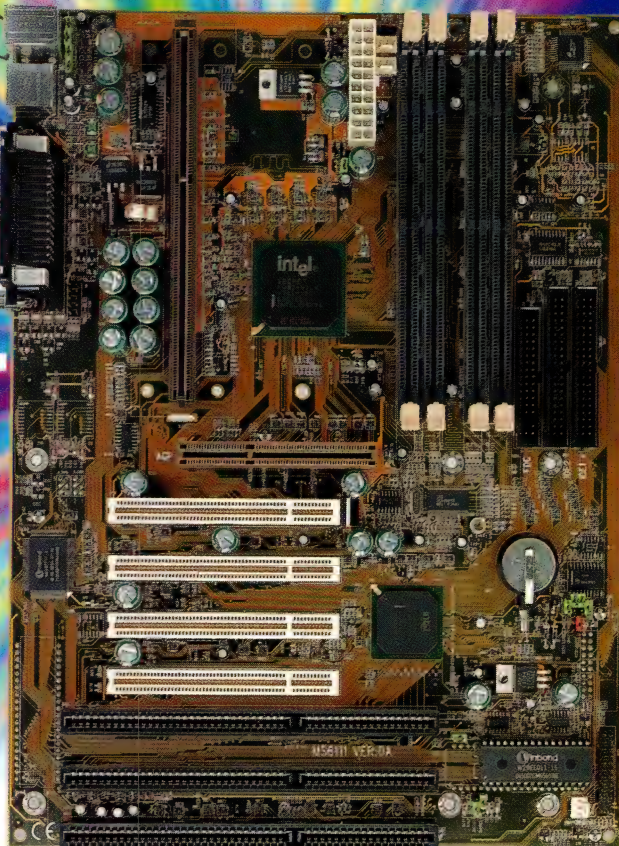
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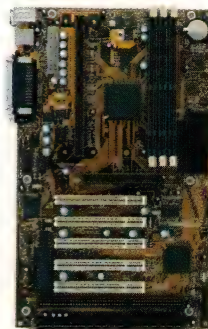
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- SiS 5597 PCset, complaint with PC97/ACPI
- Chassis accommodatable with one FDD, one HDD and one CD-ROM
- Chassis provides 1 security lock to preserve your property
- Support Chassis Intrusion Alarm. Inform you when your PC is opened
- Back panel support one VGA, Network(UTP), Speaker, Line-In, MIC-In, LPT, PS/2 Mouse and Keyboard, Dual USB Port
- Support Modern Ring Wake-Up, Soft Power Off, 3D Audio
- Riser Card supports 2 ISA and 1 PCI (1 ISA/PCI shared)
- Support S.DRAM, 3.3V EDO DRAM, Max. 256MB memory on board
- Supports Ultra DMA33 synchronous DMA mode
- PCI 10-BASET network on board compatible with IEEE802.3 standard
- 31.5cm x 8.5cm x 36.9cm (width x height x length)



MS-6117 ATX LX6 Mainboard

- Support Single 233, 266 or 300MHz Pentium[®] II Processor
- Provide 1 A.G.P. slot, support 66MHz/64Bit AGP card
- Keyboard Password Wake-Up (For Winbond 977TF V.C or later version)
- Modern Ring Wake-Up, Soft Power Off
- Optional Hardware Monitor
- System Voltage Monitor
- System Temperature Monitor
- CPU Fan Speed Monitor
- 3 DIMM. Supports a maximum memory size of 384MB with SDRAM, or 768MB with EDO DRAM (Support ECC function)
- Supports Ultra DMA33 synchronous DMA mode
- System Bootable from LS-120, ZIP, CD-ROM through BIOS setup
- 2 ISA, 5 PCI and 1 AGP slots. 30.5cm X 18.6cm, ATX



Germany PC Professionell
July, 1997 Edition
Best Editors' Choice : MS-5147

For more information:

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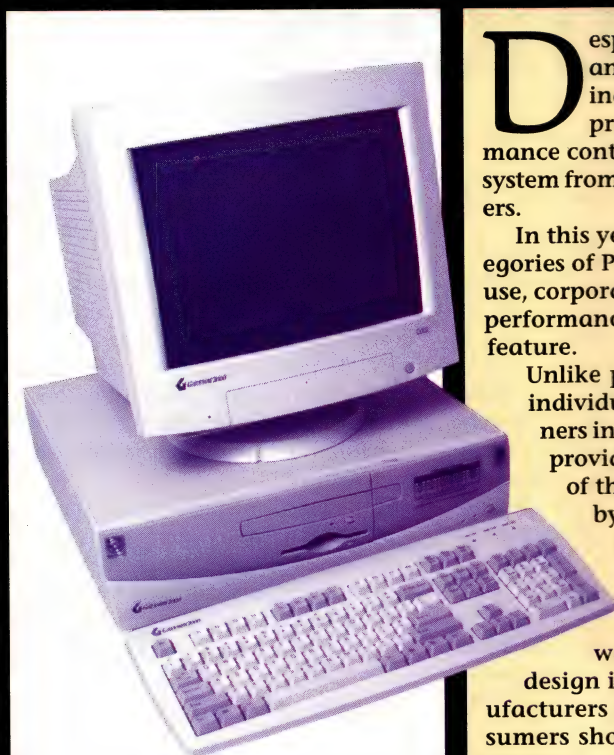
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PCs ON

PARADE



How can you pick the best machine for your needs?

By APC Labs staff

Despite ever-increasing hype about NCs, palmtops, kiosks, WebTVs and other technology-access platforms, the PC remains the dominant means by which individuals and companies access and process information. Decreasing prices and increasing performance continue to make the PC an attractive proposition, but selecting a system from the range of options on offer remains a challenge for most buyers.

In this year's PC review, we have concentrated on the three major categories of PC purchasing: consumer models for home and entertainment use, corporate desktops for widespread deployment in business, and high-performance workstations. In total, 37 PCs have been examined for this feature.

Unlike previous years, we have not singled out specific machines for individual reviews, although we have identified Editor's Choice winners in each category. Instead, in each of the three categories, we have provided some general background information on the current state of the market and how it has changed over the past year, followed by a detailed analysis of the results and specifications of the machines submitted. Tables with full benchmark details and specifications for each machine we tested can be found immediately following the analyses.

One area we have paid particular attention to is the warranty and service options available for each machine. PC design is now so highly standardised that it's very difficult for manufacturers to differentiate products in terms of performance, and consumers should not select a product solely on this basis. With PCs now playing a critical role in many businesses, a day's delay in having a faulty machine fixed is likely to have a much greater impact than a small difference in benchmark results.

As always, we cannot emphasise enough that a major purchase such as a PC requires careful planning and forethought, and reviews such as this one can only be used as a guide. Whether you are buying a single PC or fitting out an entire company, make sure you carefully consider all your needs, and double-check specifications and service requirements before committing to any purchase.



Finding out which consumer PCs have the best specifications, the fastest performance and the service to match.

For most PC vendors, the home market is the Holy Grail. Corporate PC penetration is close to reaching saturation point, and many companies are exploring non-PC alternatives such as network computers. However, the home market, while growing strongly, is still largely untapped. Data from IDC Australia and the Australian Bureau of Statistics suggests that only around 35% of Australian homes currently have a PC, and that figure includes machines which may be badly outdated.

As with most market sectors, basic expectations for consumer and home systems have changed dramatically in the past year. In December of 1996, a typical entry-level system comprised a Pentium 100MHz with an 850M hard drive, 16M of RAM, a 14in monitor, a 4x CD-ROM drive and a 14.4 or 28.8Kbps modem. From a brand-name vendor, such a system was typically priced at between \$2,300 and \$2,900, with cheaper clones undercutting that figure by a few hundred dollars.

A year later, the requirements for an

entry-level consumer system have evolved considerably (as we describe below). Talking purely in technology terms only tells part of the story, however. The design of consumer systems has evolved dramatically in the past year as PCs have increasingly been marketed as 'entertainment units'. In 1997, several companies released charcoal grey/black units, aimed at blending in with existing stereo and television setups. Even on systems that don't adopt such relatively radical colour schemes, integrated system unit/monitor combinations and other diversions from the standard component approach to PCs are increasingly common.

Changing technologies

While Intel's MMX multimedia extensions have become almost *de rigeur* on home systems, alternatives are making some headway. IDC's William Christie said that processors from AMD and Cyrix are starting to gain respect in the marketplace. "Companies like Compaq and Harvey Norman are making the Cyrix chipsets more acceptable, and are leading to the release of more affordable product into the consumer markets," he said. The uptake of such systems has been fuelled by the cheaper prices AMD and Cyrix offer for their chipsets, which reduces the overall cost of the PC.

Overproduction and resultant oversup-

ply led to a dramatic drop in RAM prices in the first quarter of 1997, and prices have remained at these reduced levels, making 32M or even 64M an affordable investment for home systems.

Because relatively little software is now sold on 3.5in disks, CD-ROM drives have become a mandatory component in any new PC purchase. Entry-level CD-ROM speeds have jumped from 4x to 24x in a year and DVD drives are widely expected to become standard features towards the middle of 1998.

Demand for Internet access has also made a built-in modem a compulsory addition to any consumer system. Ninety to 95% of PCs sold in the retail sector now come with an internal modem, according to Chris McPherson of modem manufacturer NetComm.

What's on offer

When it came to evaluating consumer PCs, APC asked vendors to supply machines with grunt. All units needed to have a minimum Intel Pentium 166MHz with MMX CPU (or equivalent), 32M of RAM, a CD-ROM drive, 16-bit sound, 33.6Kbps modem, 15in monitor and Windows 95. Keep in mind that any machines supplied with better specifications than these will generally cost more.

We received 15 machines in this cate-

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MONITOR	15" Mitsubishi *Diamond View		
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EDITOR'S CHOICE

● **Adelong ADE Advantage P233MMX**

● **Gateway 2000 G5-200**

BEST VALUE

● **Compucon Consumer PC**

The Adelong ADE Advantage P233MMX was loaded with all the components you'd expect to find in a consumer PC, as well as an impressive three-year insured warranty covering parts and labour. Although not the fastest machine in this review, at \$2,750 the ADE Advantage was \$600 less than the Beyond SuperO, which topped our tests (and included 64M of RAM). The ADE Advantage incorporated features such as an Intel Pentium MMX 233MHz CPU, 32M of SDRAM, 512K secondary cache, 3.2G hard disk drive, Sound Blaster AWE64 soundcard and Diamond Viper V330 graphics card. It sat near the top of our most demanding tests, and Adelong was one of only two companies to underwrite its warranty policy, safeguarding the consumer in case of disaster.

For those seeking a brand-name machine, we felt the Gateway 2000 G5-200 was the only one we could confidently recommend. Although it used a Pentium 200MHz MMX processor, it performed better than a number of machines using Pentium 233MHz chips. At \$2,699, it was one of the less expensive units, yet was bundled with Microsoft Office 97 Small Business Edition and a three-year warranty that included lifetime technical phone support and 30-day money-back guarantee. It was also the easiest machine to assemble, with colour-coded cables enabling a pain-free setup.

If value is what matters most to you, the Compucon Consumer PC is an attractive system which does not compromise on warranty. The Compucon Consumer PC includes an Intel Pentium MMX 200MHz with 32M of RAM; however, video performance lagged a little as there is only 1M of EDO RAM powering the WinFast graphics adapter. But for \$2,899, including an Acer scanner, Epson printer, videoconferencing kit and a three-year insured warranty, this represented good value for money.

gory. Some performed exceptionally well, others relatively poorly, proving the value of shopping around. Two machines came with only 1M of video RAM (VRAM) while others pumped away with 2M and 4M. Some offered a mere 2G hard disk drive, and one knocked the rest for dead with a 6.4G drive. One machine came bundled with an Iomega Zip drive and 64M of RAM as standard and included a scanner and printer in its purchase price.

The **Acer Entra 166MMX** was the only machine submitted with an Intel Pentium 166MHz CPU, the minimum requirement for this feature. Four sported a Pentium 200MHz and seven featured the faster 233MHz processor. Three did away with an Intel processor altogether, opting for either the IBM 6x86 200



(Also **Vogue IBM-P200** and **Edge Comet**) or **Cyrix 6x86MX PR200+** (**Busi-Soft Cyrix Performance System**).

The units submitted come standard with 32M of RAM with the exception of the **Beyond SuperO Consumer PC**, which ships with 64M. This should be taken into account when considering test results and prices.

All but three PCs used 512K secondary cache; the **Acer Entra 166MMX**, **Hewlett-Packard Pavilion 8130** and **NEC MediaMate** opted for 256K and clearly suffered in the performance stakes as a result.

Video performance varied greatly, as did the types of cards and amount of VRAM. The **ADE Advantage P233-MMX** and **Alpha Pentium 233MMX** went all out with a Diamond Viper V330 graphics controller driven with 4M of Synchronous Graphic RAM (SGRAM). Equally impressive were the **Beyond SuperO Consumer PC** and **Auspac Home Star** which were powered by a Matrox Millennium II card with

4M of WRAM. These four machines consistently featured in the top half of our tests.

A 2G or 2.1G hard disk drive was standard, however a number of machines had much larger drives. While four units had a 3.2G drive, the **Hewlett-Packard Pavilion 8130** packed a 4G unit and the **Busi-Soft Cyrix Performance System**, a 4.3G drive. But the mother of all hard drives came with the **Alpha Pentium 233MMX**, which packed a whopping 6.4G drive. CD-ROM drives capable of 24x were the norm, with only the **Acer Entra 200MMX** and **NEC MediaMate** sticking to a 16x unit.

We often see PCs bundled with lots of largely superfluous bits which seem attractive at the time of purchase but which later prove to be of little use. We looked for systems which offered valuable extras included in the initial price tag. The **Compucon Consumer PC** was the most impressively-bundled system with an Acer 4,800dpi colour scanner, Epson Stylus Color 300 inkjet printer, and videoconferencing kit. Also of note is the **Gateway 2000 G5-200**, which includes the very useful Microsoft Office 97 Small Business Edition, while the **Acer Entra 166MMX** and the **Edge Comet** bundle Lotus SmartSuite instead.

The consumer PCs all came in under the \$4,000 price tag, while the snazzy-looking but slow **Hewlett-Packard Pavilion 8130** was the most expensive system at \$3,799. The power performer **Beyond SuperO Consumer PC** was second dearest at \$3,350 but included extras such as 64M of RAM and an Iomega Zip drive. Third place went to the **AST Bravo MS5200M** which had a \$3,285 price tag. Edge Technology was able to offer the cheapest system at \$1,785, while the **Com-**



pucon Consumer PC with bundled extras was good value at \$2,899.

Performance

Disappointingly, none of the brand-name units were able to match the performance of the second-tier vendors. Because these vendors build their machines from scratch, they are able to incorporate new technologies at a faster rate than the bigger companies, which may have a large inventory to shift. The **Hewlett-Packard Pavilion 8130**, **Acer Entra 166MMX** and **NEC MediaMate** could not match the specifications nor test results of some of the smaller companies, which boost their offerings with the latest and greatest parts available.

In the Business Winstone 97 and High-End Winstone 97 tests, the **Beyond SuperO Consumer PC** led the field with its RAM advantage. Its result of 53 in the Business Winstone 97 test was only marginally ahead of the second-place-getting **Busi-Soft Cyrix Performance System** on 51, but was streets ahead of the bottom-rung entrant, the

tem, using the Cyrix 6x86MX PR200+ CPU, scored well in Business Winstone 97 but not so strongly in the High-End Winstone 97 test.) These five machines scored 17 or less in the High-End Winstone 97 test, while the leader, **Beyond SuperO Consumer PC**, sat comfortably on 24.

The **Gateway 2000 G5-200** and the **AST Bravo M55ZOOM** were the only brand names to demonstrate reasonably good performance. The Gateway achieved Business and High-End Winstone results of 44 and 19 respectively; the AST managed 45 and 21. For more details, see our test results beginning over the page.

Service and warranty

In 1995, Australia's top PC company, Osborne, went bust, leaving hundreds of PC buyers high and dry. Those who already had Osborne machines had effectively lost their five-year warranties until Gateway 2000 stepped in a few weeks later, announcing it would buy Osborne and honour the warranties for a maximum of three years. Without the purchasing power of Gateway 2000, the warranties offered by Osborne would have been worthless.

As this cautionary tale demonstrates, it is important when buying a machine, particularly from a smaller vendor, to ask if the warranty is insured. This means that even if the company goes broke and closes down tomorrow, the PC's warranty is backed by an insurance company which will ensure it is honoured.

Of the 15 machines in this category, only two were backed by an insured warranty: the **Adelong ADE Advantage P233MMX** and the **Compucon Consumer PC**. You may find it surprising that the bigger names such as Acer and AST and Gateway 2000 do not offer an insured warranty ("The chances of us going bust tomorrow are slim" was the common catchphrase). You may feel safer buying a brand name, but remember, an uninsured warranty is an uninsured warranty — regardless of who is offering it. Always proceed with caution in this respect (see 'Ser-

vice and Reliability' on page 67 for more buying tips).

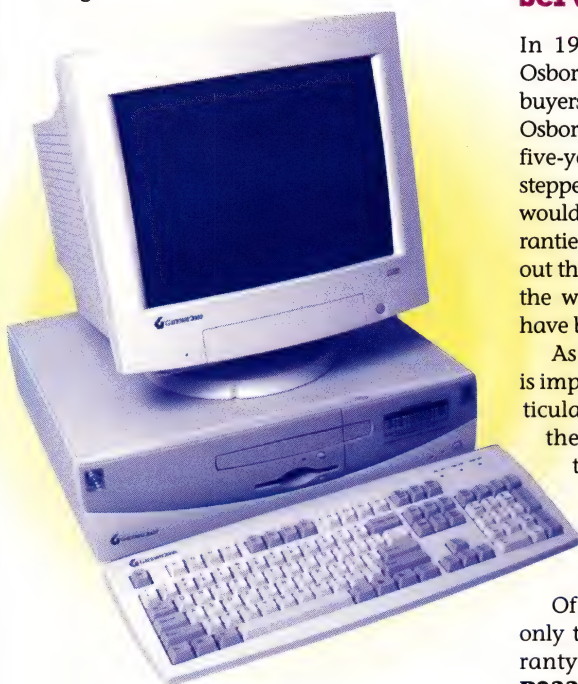
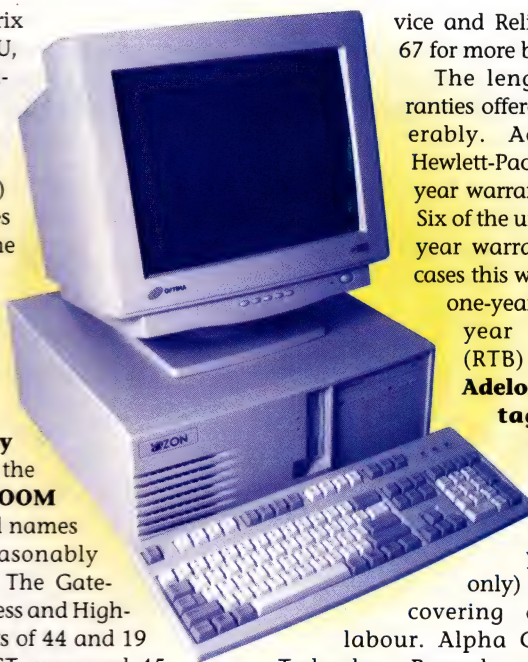
The length of the warranties offered varied considerably. Acer, NEC and Hewlett-Packard have a one-year warranty on their PCs. Six of the units have a three-year warranty, but in two cases this was divided into a one-year onsite and two-year return-to-base (RTB) coverage. The **Adelong ADE Advantage P233MMX** and **Compucon Consumer PC** incorporated a three-year (system

only) onsite warranty covering all parts and labour.

Alpha Computer, Also Technology, Beyond and Busi-Soft Computers include a two-year parts and five-year labour RTB warranty on their machines. Both Auspac and Edge have stuck to a two-year RTB offering. For those seeking additional support, Beyond sells a three-year onsite warranty for \$300 and Auspac a \$75 per year (up to three years) warranty. Both of these onsite warranties are insured. Optima lets you convert its **Optima OCT Pentium P5-233MHz MMX's** three-year RTB cover to a three-year onsite warranty for \$175.

On the customer service front, all vendors offer reasonable customer and/or technical telephone support. Monday to Friday during business hours was the standard support availability. However, some companies stood out in this respect. Gateway 2000 offers technical support from 6am to 7pm weekdays and 9am to 5.30pm on weekends, and customer support 9am to 5.30pm on weekdays. Hewlett-Packard was the only other company to offer full weekend as well as weekday support, operating its customer support line between 8.30am and 5.30pm seven days a week.

Acer, Adelong, Auspac and Beyond have a six-day customer hotline. (Edge Computers does not itself provide support. This is the responsibility of its resellers.) If you are a new PC user, consider companies which offer customer support suitable for you. And remember, if a system seems expensive for what it's offering, check out its back-up services. This can often add a considerable margin to the initial price tag but should not be underestimated in terms of real value.



Acer Entra 166MMX, on 35. Other low scores were recorded by the **NEC MediaMate** (36) and **Hewlett-Packard Pavilion 8130** (39).

Similarly, these three low-scorers held insignificant positions in the High-End Winstone 97 test, along with the **Also Vogue IBM-P200** and **Edge Comet**, both of which used the IBM 6x86 200 CPU. (The **Busi-Soft Cyrix Performance Sys-**

Specifications: Consumer PCs

Product	Busi-Soft Cyrix Performance System	Compucon Consumer PC	Edge Comet	Gateway G5-200	HP Pavilion 8130	NEC MediaMate	Optima OCT Pentium P5-233MHz MMX	TPG Pentium 233MMX Basic Multimedia
Distributor	Busi-Soft Computers	Compucon	Edge Technology	Gateway 2000	Hewlett-Packard	NEC	Optima Computer Technology	TPG
Phone	(03) 9890 8900	(02) 9417 7166	(02) 9353 9200	1800 500 734	131 347	131 632	(02) 9841 2777	(02) 9850 0800
Price	\$2,499	\$2,899	\$1,785	\$2,699	\$3,799	\$2,399	\$2,245	\$2,995
Online	http://www.busi-soft.com.au	http://www.compucon.com	-	http://www.gw2k.com.au	http://www.hp.com.au	http://www.nec.com.au	http://www.optima.com.au	http://www.tpgi.com.au

Testing configuration

Processor	Cyrix 6x86MX PR200+	Intel Pentium MMX 200MHz	IBM 6x86 200MHz	Intel Pentium MMX 200MHz	Intel Pentium MMX 233MHz	Intel Pentium MMX 200MHz	Intel Pentium MMX 233MHz	Intel Pentium MMX 233MHz
RAM/type	32M/SDRAM	32M/EDO DRAM	32M/EDO DRAM	32M/SDRAM	32M/EDO DRAM	32M/EDO DRAM	32M/SDRAM	32M/EDO DRAM
Secondary cache	512K	512K	512K	512K	256K	256K	512K	512K
Hard disk controller	UltraDMA	UltraDMA	UltraDMA	UltraDMA	Mode 4 EIDE	Mode 4 EIDE	UltraDMA	UltraDMA
Hard disk size	4.3G	2.1G	2G	2G	4G	2.5G	2.1G	3.2G
Hard disk file system	FAT32	FAT32	FAT32	FAT32	FAT32	FAT32	FAT32	FAT32
Graphics adapter	Diamond Stealth 3D 2000 Pro	WinFast S280V2	S3 Virge	ATI Rage II	ATI 264-VT3	Cirrus Logic 5446	S3 Virge DX	S3 Virge
Graphics RAM/type	4M/EDO DRAM	1M/EDO DRAM	2M/EDO DRAM	2M/SGRAM	2M/EDO DRAM	1M/DRAM	4M/EDO DRAM	4M/EDO DRAM
Resolution/colour depth/refresh rate	1,024x768/256/60Hz	1,024x768/256/60Hz	1,024x768/256/60Hz	1,024x768/256/60Hz	1,024x768/256/60Hz	1,024x768/256/60Hz	1,024x768/256/60Hz	1,024x768/256/60Hz
CD-ROM drive	Panasonic 24x	24x	24x	Mitsumi 24x	24x	NEC 16x	Mitsubishi 24x	Diamond Data 24x
CD-ROM controller/cache setting	ATAPI/Windows	ATAPI/Windows	ATAPI/Windows	ATAPI/Windows	ATAPI / Windows	ATAPI / Windows	ATAPI / Windows	ATAPI/Windows
Operating system	Windows 95B	Windows 95B	Windows 95B	Windows 95B	Windows 95B	Windows 95B	Windows 95B	Windows 95B

Benchmarks

CD-ROM WinMark 97	1,346	1,200	1,640	641	1,310	992	1,350	1,210
CPUMark32	434	408	383	416	401	343	440	442
Business Disk WinMark 97	1,360	702	808	892	699	875	738	752
High-End Disk WinMark 97	4,523	2,323	2,353	2,720	1,896	2,743	2,223	2,316
Business Graphics WinMark 97	108	65	64	85	79	53	85	85
High-End Graphics WinMark 97	49	32	31	38	39	28	39	32
Business Winstone 97: Overall	51	40	42	44	39	36	43	42
High-End Winstone 97: Overall	19	18	17	19	16	17	19	18

Features

Monitor	Philips 105s 15in	View Excel 15in	KTX 15in	Gateway CS 15in	HP Pavilion Multimedia 15in	NEC ISA 15in	CM 1520 15in	TPG 15in
Sound interface	Sound Blaster AWE64	Sound Blaster 16	ESS 1868 AudioDrive	Ensoniq Audio PCI	AD 1816	Sound Blaster 16	Optimedia ESS 1869 3D	Sound Blaster AWE64
Speakers	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Modem	US Robotics Sportster 33.6K internal	Zentech 33.6K	KTX 33.6K internal	NetComm InModem SVD 33.6K	K56Flex 56K DSVD	Creative Phone Blaster 33.6K internal	Websurfer K56Flex 56K internal	GVC 33.6K
Back-up device	No	No	No	No	No	No	No	No
Keyboard	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Mouse	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Bundled software	No	No	Lotus SmartSuite 97	Microsoft Office 97 Small Business Edition	Assorted packages	No	No	Microsoft Home Essentials
Warranty	2 years parts, 5 years labour RTB	3 years onsite parts and labour - insured	2 years parts and labour RTB	3 years parts and labour (1 year onsite, 2 years RTB)	1 year parts and labour onsite	1 year parts and labour onsite	3 years parts and labour RTB	3 years parts and labour RTB
Other	-	Colour inkjet printer, videoconferencing kit, colour flatbed scanner	-	-	-	-	Warranty options	-

Notes

1. All products used in these tests are shipping versions available to the public at the time of publication.
2. Winstone, WinBench and associated programs are registered trademarks of the Ziff-Davis Publishing Company.
3. These tests were performed without independent verification by Ziff-Davis, and Ziff-Davis makes no representations or warranties as to the results.



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Specifications: Consumer PCs

Product	Acer Entra 166MMX	ADE Advantage P233MMX	Alpha Pentium 233MMX	Also Vogue IBM-P200	AST Bravo MS5200M	Auspac Home Star	Beyond Super0 Consumer PC
Distributor	Acer	Adelong Computers	Alpha Computer	Also Technology	AST	Auspac Computers	Beyond Computers
Phone	(02) 9870 1999	1800 626 345	(03) 9415 9177	(02) 9519 4600	(02) 9395 1800	(02) 9748 4822	(02) 9417 3688
Price	\$2,289	\$2,750	\$2,900	\$1,840	\$3,285	\$2,538	\$3,350
Online	http://www.acer.com.au	http://www.adelong.com.au	http://www.alpha.com.au	http://www.alsotech.com.au	http://www.ast.com.au	-	http://www.beyondcomputers.com.au

Testing configuration

Processor	Intel Pentium MMX 166MHz	Intel Pentium MMX 233MHz	Intel Pentium MMX 233MHz	IBM 6x86 200MHz	Intel Pentium MMX 200MHz	Intel Pentium MMX 233MHz	Intel Pentium MMX 233MHz
RAM/type	32M/EDO DRAM	32M/SDRAM	32M/SDRAM	32M/SDRAM	32M/SDRAM	32M/EDO DRAM	64M/SDRAM
Secondary cache	256K	512K	512K	512K	512K	512K	512K
Hard disk controller	Mode 4 EIDE	UltraDMA	UltraDMA	UltraDMA	UltraDMA	UltraDMA	UltraDMA
Hard disk size	2G	3.2G	6.4G	2.1G	2.0G	3.2G	3.2G
Hard disk file system	FAT32	FAT32	FAT32	FAT32	FAT32	FAT32	FAT32
Graphics adapter	Aopen 3D Artist PT60	Diamond Viper V330	Diamond Viper V330	ATC 2345 S3d Virge	ATI Rage II	Matrox Millennium II	Matrox Millennium II
Graphics RAM/type	2M/DRAM	4M/SGRAM	4M/SGRAM	2M/EDO DRAM	2M/SGRAM	4M/WRAM	4M/WRAM
Resolution/colour depth/refresh rate	1,024x768/256/60Hz	1,024x768/256/60Hz	1,024x768/256/60Hz	1,024x768/256/60Hz	1,024x768/256/60Hz	1,024x768/256/60Hz	1,024x768/256/60Hz
CD-ROM drive	Acer CD-916E 16x	Panasonic 24x	Mitsumi 24x	Sony 24x	AST 24x	Mitsubishi 24x	Sony 24x
CD-ROM controller/cache setting	ATAPI/Windows	ATAPI/Windows	ATAPI/Windows	ATAPI/Windows	ATAPI/Windows	ATAPI/Windows	ATAPI/Windows
Operating system	Windows 95B	Windows 95B	Windows 95B	Windows 95B	Windows 95B	Windows 95B	Windows 95B

Benchmark results

CD-ROM WinMark 97	1,096	1,313	1,380	1,080	998	1,326	1,370
CPUMark32	306	441	434	359	413	444	443
Business Disk WinMark 97	701	1,123	1,116	814	1,030	749	2,953
High-End Disk WinMark 97	2,083	3,723	3,243	2,296	3,250	2,263	3,820
Business Graphics WinMark 97	63	108	102	68	80	101	102
High-End Graphics WinMark 97	28	47	43	29	37	44	44
Business Winstone 97: Overall	35	48	48	41	45	45	53
High-End Winstone 97: Overall	15	21	21	15	21	20	24

Features

Monitor	AcerView 54eL 15in	Samsung SyncMaster 500S 15in	Philips 105B 15in	AcerView 54e 15in	Samsung SyncMaster 500B 15in	Samsung SyncMaster 500S 15in	Sony CPD100 15in
Sound interface	Magic MP32	Sound Blaster AWE64	Sound Blaster AWE64	Yamaha Wavetable 3D Sound	ESS 1869	Sound Blaster 16	Sound Blaster AWE64
Speakers	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Modem	Magic MP32 internal	Banksia 33.6K internal	NetComm Roadster 33.6K	No	33.6K internal	Banksia Wave SP 33.6K internal	Banksia Wave SP 33.6K
Back-up device	No	No	No	No	No	No	Iomega Zip
Keyboard	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Mouse	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Bundled software	Lotus SmartSuite, Classic Games, PC-cillin 95	No	No	Microsoft Home Pack	Intel LANDisk, McAfee VirusScan	No	No
Warranty	1 year RTB parts and labour	3 years onsite parts and labour – insured	2 years parts, 5 years labour RTB	2 years parts, 5 years labour RTB	3 years parts and labour (1 year onsite, 2 years RTB)	2 years parts and labour RTB	2 years parts, 5 years labour RTB
Other	-	-	-	ATC 2465 3DFX Voodoo 3D accelerator	-	Warranty options	Warranty options

Notes

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2. Winstone, WinBench and associated programs are registered trademarks of the Ziff-Davis Publishing Company.
3. These tests were performed without independent verification by Ziff-Davis, and Ziff-Davis makes no representations or warranties as to the results.



Can Wintel systems provide a real challenge in the high-performance workstation market?

Unix has traditionally been the heartland of the workstation world. Vendors such as Hewlett-Packard, IBM, Silicon Graphics and Sun Microsystems have hoed a profitable row in the niche market for immensely powerful desktop workstations, targeted at applications such as CAD/CAM, high-end graphics, 3D rendering and (more recently) digital video editing. The traditional view has held that Windows is an inappropriate environment to run such applications, because of the lack of stability, performance grunt and dedicated applications for this market sector.

While there have been noises about a sea change in this area for some time, 1997 has marked the emergence of the first real Wintel challengers to the Unix workstation players. The switch comes at a time when traditional workstation vendors are already feeling the pinch; at Silicon Graphics, recent management turmoil has culminated in the resignation of founding CEO Edward McCracken and a first quarter loss of \$US37 million. While Sun's profits haven't been hit to the same extent, the company's focus on emerging technologies such as NCs can also

be read as signalling a desire to reduce dependency on workstation revenue.

A key factor in the emergence of the Intel-based workstation has been the porting of key applications to 32-bit Windows platforms. Professional packages such as Softimage Extreme 3D can now offer performance on a Pentium II workstation that is comparable to a Unix workstation, at far lower initial outlay. Part of the appeal of Wintel workstations also lies in their ability to run standard-issue shrink-wrapped applications alongside the vertical market packages that are the backbone of the workstation market.

The importance of software was acknowledged by Compaq when it launched itself into the workstation marketplace in June this year. The company sealed deals with 19 major ISVs to ensure there would be broad applications support for its workstation offerings, which had made their first experimental forays into the market the previous October. Compaq's full range includes a four-processor monster for the ultimate in Intel-based workstation processor computing.

Compaq, however, is just one major vendor to realise the potential in this market. Dell and Gateway 2000 have also made major entries into the workstation space this year, and rumblings can be heard from other top-tier PC vendors. However, it isn't

just the big manufacturers that can provide high performance levels. Based on our examination of the machines submitted for this review, workstation performance is achievable using systems compiled from off-the-shelf PC components.

What's on offer

For machines submitted in this review, APC specified a minimum of 64M of RAM, a CD-ROM drive, at least a 17in monitor, Windows NT 4.0 Workstation and an Intel Pentium II 266MHz or 300MHz processor. All other specifications were left up to the manufacturer, in order to see what configurations would be recommended. Three international brand-name vendors submitted workstations for this review: Compaq, Dell and Gateway 2000. The other companies that entered systems were Australian component assemblers.

We were able to distinguish two broad categories among the machines submitted: heavy-duty professional workstations intended to compete directly with the traditional workstation companies, and 'Pentium II power on a budget' systems that still offer stronger performance than standard PC platforms.

Until recently, the 300MHz version of the Pentium II was in very limited supply and most vendors were unable to offer any sys-

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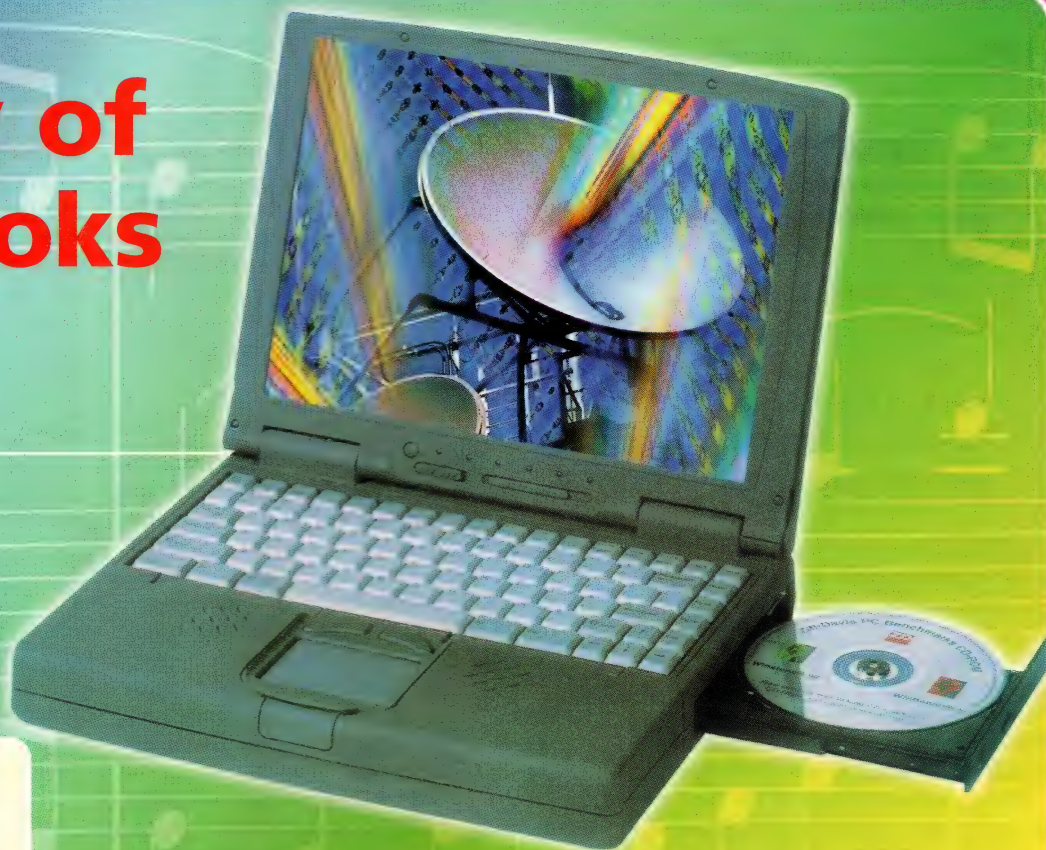


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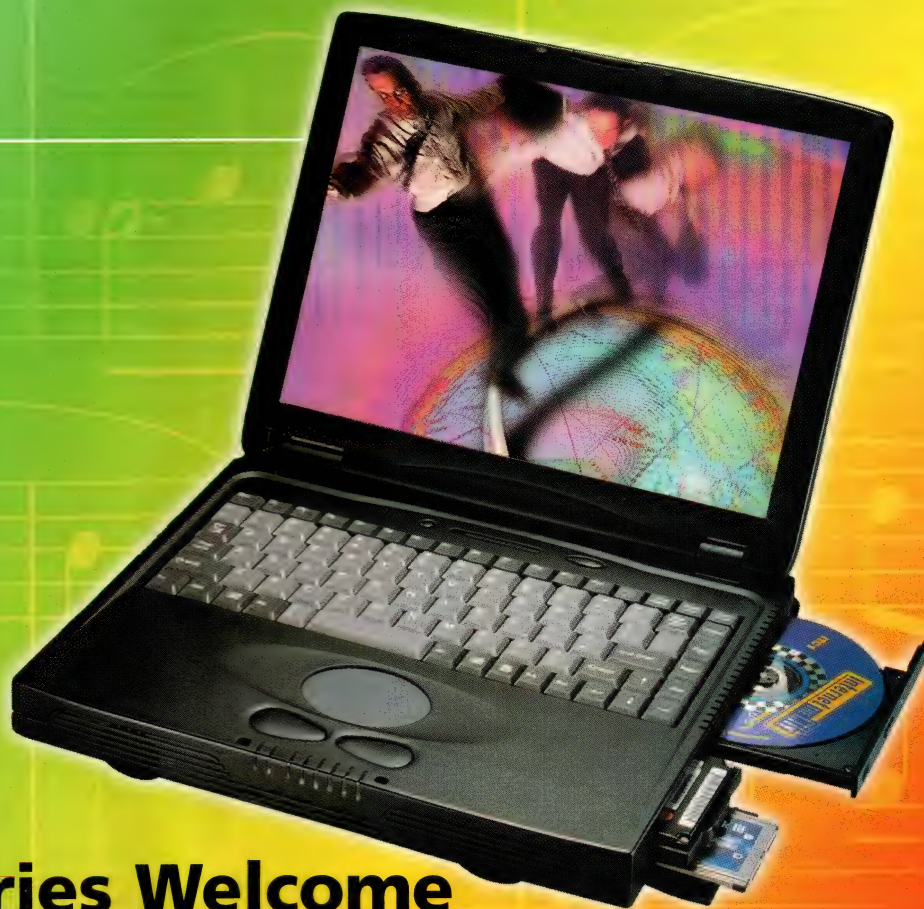


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EDITOR'S CHOICE

• None

HIGHLY COMMENDED

• **Busi-Soft Pentium II Performance System**• **Dell WorkStation 400**

Although there's no doubt about the value-for-money proposition that Wintel workstations represent, the market has yet to evolve clearly enough to make awarding an Editor's Choice a realistic option. However, two systems impressed us enough to earn Highly Commended rankings.

By definition, in the workstation market performance is key, and in pure performance terms the Busi-Soft Pentium II Performance System screamed ahead of all of the other competitors in our benchmark testing. Its mix of quality components and strong performance, all enclosed in a sub-\$5,000 package, earned it a Highly Commended award. Reliability is also key in workstations, however, and for many users the familiarity of a global brand name with recognised financial backing and support services will be vital.

While it didn't have the best performance in our Windows application tests, the Dell WorkStation 400 contained a number of features that will appeal to corporate power users, such as ECC memory, excellent configurability and expansion and Dell's three-year warranty. These, along with its 3D OpenGL engine, place it in the upper rankings of the 3D workstation category and also scored it a Highly Commended badge.

tems using this processor. However, Intel has boosted production significantly and systems are now available in volume. With higher-speed Pentium II processors just around the corner, workstations are entering a new era of performance. As well, any component assembler can now build dual-processor Intel Pentium II 300MHz systems. All the major motherboard manufacturers build dual-processor-capable motherboards that are easy to incorporate into systems.

Motherboards manufactured using the new Intel LX chipset formed the core of most of the workstations in this review. (For a comparison of LX motherboards, see APC

November, page 121.) The older Intel FX chipset only supported Extended Data Output (EDO) Dynamic RAM (DRAM), which provided some performance restrictions. All but two of the systems submitted for this review took advantage of the LX's greater flexibility and incorporated faster SDRAM for maximum performance.

Performance

The benefits of this can be seen clearly in the results of the CPUMark32 benchmark tests. The top five performers were all 300MHz Pentium II systems using LX motherboards and SDRAM. A unique feature of the Dell and Compaq units is their use of EDO ECC (error correcting code) memory. ECC memory is more efficient in checking for errors from memory operations and provides added security and accuracy when running complex rendering and computation tasks.

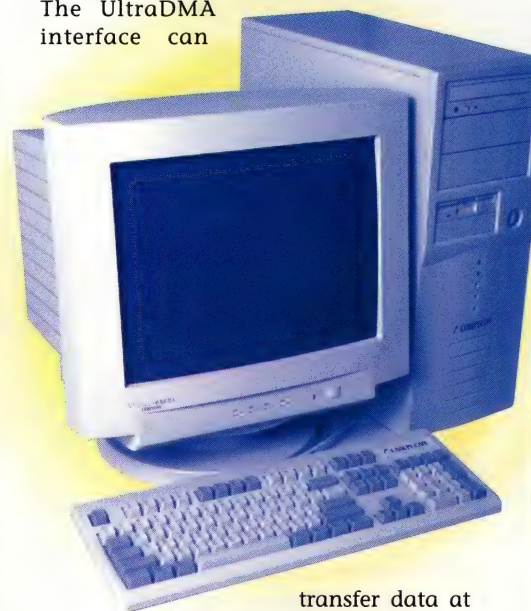
The CPUMark32 performance benchmark from Ziff-Davis measures how fast the processor, memory and cache subsystems of a PC operate. The **Busi-Soft Pentium II Performance System** Pentium II 300MHz with 64M of Synchronous DRAM (SDRAM) and 512K of secondary cache proved a winning combination in this test. Its top score of 797 was 11 points ahead of its closest competitor, the **Beyond SuperO Personal Workstation**, which was a 300MHz system with 128M of SDRAM.

One interesting point that came out of our testing was that the extra grunt provided by a 300MHz Pentium II processor does not ensure superior performance. The **Alpha Pentium II 266** came second in both of the High-End and Business Winstone 97: Overall application tests, ahead of a number of systems using 300MHz processors.

The LX chipset provides several other

significant features that further boost Pentium II-based system performance over the older FX technology. One of these improvements is the UltraDMA IDE hard disk interface, which lets system integrators equip Pentium II systems with UltraDMA IDE hard drives that are much cheaper than an Ultra Wide SCSI drive of the same size.

The UltraDMA interface can



transfer data at up to 33M per second.

The **ADE Advantage PII 266, Busi-Soft Pentium II Performance System, Edge Personal Workstation, Gateway GP6-266, IPS Vision-98, Optima Vizon LX and TPG ATX-Ultra Pentium II 300 Office** systems all used UltraDMA IDE hard disks. Most of these systems were priced at less than \$5,000. The **Edge Personal Workstation** and the **Gateway GP6-266** provided Pentium II levels of performance for under \$4,000.

At the other end of the scale, profes-

Super graphics

One addition to the LX motherboard's feature set, the inclusion of the AGP graphics interface, should prove a major boon for workstation performance. Although not fully realised when running under Windows NT 4.0, AGP graphics accelerators can run at twice and even four times the speed of conventional PCI graphics accelerators, because of the greater bus bandwidth provided.

An AGP graphics adapter can talk to the main system bus at 66MHz in 1x mode or 133MHz in 2x mode (standard PCI can

only manage 33MHz). The Intel specification was designed with 3D applications in mind. Not only does AGP talk to the bus at incredibly fast speeds, it also has direct high-speed access to the main system memory. AGP has enabled workstations with large amounts of memory to use main system memory to perform memory-intensive texture mapping for 3D.

While AGP promises major improvements, at the time of going to press there were no benchmarks available to measure the exact performance improvement it provides.

sional workstations with Ultra Wide SCSI storage subsystems started from around \$6,000 for the **Beyond SuperO Personal Workstation** and the **Compucon Personal Workstation**. The **Dell Workstation 400** and the **Compaq Professional Workstation 6000** are both priced at over \$10,000.

All of the workstations APC tested implemented high-end desktop graphics accelerators or OpenGL workstations graphics adapters (see 'Super graphics' for further discussion). These graphics powerhouses are equipped with large amounts of RAM to handle textures and complex 3D acceleration.

Both the **Dell Workstation 400** and the **Compaq Professional Workstation** used PCI ELSA GLoria-L accelerator boards. These cards can have up to 24M of memory on board, which significantly increases the cost of the PC. The ELSA cards are designed to accelerate OpenGL 3D applications and are not optimised for standard Windows functions;



hence their relatively low performance scores in the High-End Graphics WinBench tests.

The Diamond Fire GL Pro found in the **Alpha Pentium II 266** was also in a similar league, featuring 8M of SGRAM and talking over the AGP bus. The new Diamond Viper V330 was a popular choice among the workstation vendors, and was present in the **ADE Advantage PII 266**, **Beyond SuperO Personal Workstation** and the **Busi-Soft Pentium II Performance System** which used the AGP version. This new accelerator is designed for the Windows 95/NT desktop market. The **Busi-Soft Pentium II Performance System** enjoyed the fastest performance in the High-End Graphics WinMark, High-End and Business Winstone overall tests.

All of the units, with the exception of the Beyond machine, used ATAPI CD-ROM drives. These drives varied in speed from 16x to 24x. Beyond opted for an 18x NEC drive.

How we tested

These are the benchmarking tests and procedures we used in this feature:

Winstone 97

Winstone 97 is the primary tool used by APC to test the overall performance of a computer system. Winstone is a system-level benchmark that runs a script of common business and high-end applications and records how long it takes to execute each application, providing an aggregate score at the end of the sequence. In the Business Winstone test, these applications include:

Business graphics/DTP: Adobe PageMaker 6.0, CorelDRAW 6.0, Microsoft PowerPoint 7.0

Database: Borland Paradox 7.0, Microsoft Access 7.0

Word processing/spreadsheet: Microsoft Excel 7.0, Lotus WordPro 96, Microsoft Word 7.0

The High-End Winstone test uses the following applications to test workstation system performance:

Application development: Microsoft Visual C++ 4.1

Image editing: Adobe Photoshop 3.0.5, Micrografx Picture Publisher 6.0,

CAD/3D: Bentley Systems MicroStation 95, Visual Numerics PV-Wave 6.0, Advanced Visual Systems AVS/Express 3.0

Currently, Winstone 97 can only run on Windows 95, Windows NT 3.51 and Windows NT 4.0. It is possible to compare Winstone 97 scores with those from systems which use the same operating system, but differences in the file systems and kernels make comparison of results between different operating systems inappropriate.



WinBench 97 1.1

WinBench tests the different subsystems of a computer. The tests include CPUMark, CD-ROM WinMark, Disk WinMark and Graphics WinMark. These provide comparative data not only for complete computer systems, but also for components such as 2D graphics accelerators, hard drives, CD-ROM/DVD drives and motherboards.

The results of each of these subtests is either a calculation of transfer rate (measured in thousands of bytes per second), such as the Disk WinMark and CD-ROM WinMark, or a comparative evaluation, as in the case of the CPUMark test. The Graphics WinMark and Disk WinMark tests are both divided into High-End and Business categories. Both simulate the tasks of the disk and graphics subsystem which take place when their respective Winstone tests are run. WinBench 97 1.1 can be run on Windows 95 and Windows

NT 4.0. The 1.1 upgrade enables disk scores to be compared between drives that use the FAT16 and FAT32 partition schemes found in Windows 95 OSR2 (and the upcoming Windows 98). It is not possible to accurately compare disk scores between WinBench 97 and WinBench 97 1.1.

The tables for each section contain the configuration details of all of the systems tested. Each of the tests was run three times under identical configurations and the average of the three results was taken as the final result.

Testing Notes

- All products used in these tests are shipping versions available to the public at the time of publication.
- Winstone, WinBench and associated programs are registered trademarks of the Ziff-Davis Publishing Company.
- These tests were performed without independent verification by Ziff-Davis, and Ziff-Davis makes no representations or warranties as to the results of the tests.
- The use of the Intel BusMastering hard disk driver on systems using UltraDMA hard drives reports incorrectly high scores in the Ziff-Davis WinBench Business Disk WinMark and High-End Disk WinMark. Some of the systems in this review report these inaccurate results.

Specifications: Workstation PCs

Product	ADE Advantage P II 266	Alpha Pentium II 266	Beyond SuperO Personal Workstation	Busi-Soft Pentium II Performance System	Compaq Professional Workstation 6000	Compucon Personal Workstation
Distributor	Adelong Computers	Alpha Computer	Beyond Computers	Busi-Soft Computers	Compaq	Compucon
Phone	1800 626 345	(03) 9415 9177	(02) 9417 3688	(03) 9890 8900	(02) 9911 1999	(02) 9417 7166
Price	\$4,250	\$5,800	\$5,990	\$4,599	\$11,282	\$5,999
Online	http://www.adelong.com.au	http://www.alpha.com.au	http://www.beyondcomputers.com.au	http://www.busi-soft.com.au	http://www.compaq.com.au	http://www.compucon.com

Testing configuration

Processor	Intel Pentium II MMX 266MHz	Intel Pentium II MMX 266MHz	Intel Pentium II MMX 300MHz	Intel Pentium II MMX 300MHz	Intel Pentium II MMX 266MHz	Intel Pentium II MMX 300MHz
RAM/type	64M/SDRAM	64M/SDRAM	128M/SDRAM	64M/SDRAM	64M/ECC EDO DRAM	64M/SDRAM
Secondary cache	512K	512K	512K	512K	512K	512K
Hard disk controller	UltraDMA	Ultra Wide SCSI	Ultra Wide SCSI	UltraDMA	Ultra Wide SCSI	Ultra Wide SCSI
Hard disk size	4.3G	4.5G	4.2G	6.4G	4.6G	4.5G
Hard disk file system	NTFS	NTFS	NTFS	NTFS	NTFS	NTFS
Graphics adapter	Diamond Viper V330	Diamond Fire GL 1000 Pro AGP	Diamond Viper V330	Diamond Viper 330 AGP	ELSA GLoria-L	ASUS AGP-V3000
Graphics RAM/type	4M/SGRAM	8M/SGRAM	4M/SGRAM	4M/SGRAM	8M DRAM + 8M VRAM	4M/SGRAM
Resolution/colour depth/refresh rate	1,024x768/256/60Hz	1,024x768/256/60Hz	1,024x768/256/60Hz	1,024x768/256/60Hz	1,024x768/256/60Hz	1,024x768/256/60Hz
CD-ROM drive	Panasonic 24x	Toshiba 24x	NEC 18x	Panasonic 24x	16x	24x
CD-ROM controller/cache setting	ATAPI/Windows	ATAPI/Windows	SCSI/Windows	ATAPI/Windows	ATAPI/Windows	ATAPI/Windows
Operating system	Windows NT 4.0 Workstation	Windows NT 4.0 Workstation	Windows NT 4.0 Workstation	Windows NT 4.0 Workstation	Windows NT 4.0 Workstation	Windows NT 4.0 Workstation

Benchmark results

CD-ROM WinMark 97	1,533	1,745	1,530	1,553	1,263	1,530
CPU Mark32	697	728	786	797	695	751
Business Disk WinMark 97	987	1,615	1,463	1,423	970	1,683
High-End Disk WinMark 97	2,570	4,245	3,443	3,736	3,153	4,756
Business Graphics WinMark 97	134	135	139	155	80	112
High-End Graphics WinMark 97	61	52	62	67	35	56
Business Winstone 97: Overall	74	80	78	86	67	78
High-End Winstone 97: Overall	37	37	35	38	32	35

Features

Monitor	Magtron DJ707 17in	Samsung SyncMaster 700S 17in	NEC E700 17in	AcerView 78ie 17in	Compaq P70 17in	View Excel 7688 17in
Sound interface	Sound Blaster AWE64	Sound Blaster AWE64	No	No	Compaq 16-bit	No
Speakers	Yes	Yes	No	No	Yes	No
Modem	No	No	No	No	No	No
Back-up device	No	No	No	No	No	LS-120 120M floppy drive
Keyboard	Yes	Yes	Yes	Yes	Yes	Yes
Mouse	Yes	Yes	Yes	Yes	Yes	Yes
Network interface	EZ3200 PCI Ethernet	No	Intel EtherExpress	No	Compaq Ethernet/100TX	Intel EtherExpress
Bundled software	No	No	No	No	Compaq Insight Manager	No
Warranty	3 years parts and labour	2 years parts, 5 years labour	2 years parts, 5 years labour	2 years parts, 5 years labour	3 years parts, 1 year labour	3 years parts and labour

Notes

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MODEL	Alpha Pentium166MMX	Alpha Pentium 233MMX	Alpha Pentium II 300	
PROCESSOR	Intel Pentium 166MMX CPU	Intel Pentium 233MMX CPU	Intel PentiumII 300Mhz CPU	Other configurations based on Intel Pentium processors are also available, please call us for a quotation.  Nation-wide on-site warranty is now available at a flat rate of \$200 per computer, please call for details.
L2 CACHE	512K	512K	512K	
FEATURES	Intel Triton TX chipset, supports Ultra DMA	Intel Triton TX chipset, supports Ultra DMA	Intel 440LX chipset, supports Ultra DMA	
RAM	32MB SDRAM	32MB SDRAM	64MB SDRAM	
BUS	4 x PCI Bus, 3 x ISA Bus 2MB EDO RAM	4 x PCI Bus, 3 x ISA Bus	4 x PCI Bus, 3 x ISA Bus	 Past Alpha winners from Australian Personal Computer magazine: • Nov '90 - Alpha 386SX (Winner) • July '91 - Alpha 386/33 (Editors Choice) • Oct '94 - Alpha Pentium 66 (Editors Choice) • December '95 - Alpha Pentium 75 (Bang for Buck) • Dec '96 - Alpha P166+ (Editors Choice) • Dec '96 - Alpha Pro P166+ (Editors Choice) • Dec '96 - Alpha Pentium Pro 200 (Highly Commended)
FLOPPY DRIVE	1.44MB <i>Panasonic</i>	1.44MB <i>Panasonic</i>	1.44MB <i>Panasonic</i>	
HARD DISK	2.1GB <i>Quantum</i> Ultra DMA 9.5ms, 4500 rpm	6.4GB <i>IBM</i> Ultra DMA 9.5ms, 5400 rpm	6.4GB <i>IBM</i> Ultra DMA 9.5ms, 5400 rpm	
GRAPHICS CARD	<i>Diamond Stealth 3D Pro</i> 64 bit PCI, 2MB EDO RAM	<i>Diamond Viper 330</i> 128 bit PCI, 4MB SGRAM	<i>Diamond Viper 330 AGP</i> 128 bit, 4MB SGRAM	
SOUND CARD	<i>Sound Blaster 16 PNP</i>	<i>Sound Blaster 64 AWE PNP</i>	<i>Sound Blaster 64 AWE PNP</i>	
CD-ROM DRIVE	<i>Mitsumi</i> 24 speed IDE	<i>Mitsumi</i> 24 speed IDE	<i>Mitsumi</i> 24 speed IDE	
SPEAKERS	Twin speakers with built-in 60 watts amplifier	Twin speakers with built-in 120 watts amplifier	Twin speakers with built-in 120 watts amplifier	
CONTROLLER	32 bit onboard Enhanced HD/FD controller	32 bit onboard Enhanced HD/FD controller	32 bit onboard Enhanced HD/FD controller	
PORTS	2 x 16550 serial, 1 x parallel, 1 x PS/2 ports	2 x 16550 serial, 1 x parallel, 1 x PS/2 ports	2 x 16550 serial, 1 x parallel, 1 x PS/2 ports	ALPHA COMPUTER (AUST) PTY. LTD. 26 Hoddle Street, Abbotsford, Vic. 3067 Telephone (03) 9415 9177 Facsimile (03) 9415 9188
CASE	Desktop or Mini-tower and power supply	Desktop or Mini-tower and power supply	Desktop or Mini-tower and power supply	
KEYBOARD	<i>ACER</i> 104 keys	<i>ACER</i> 104 keys	<i>Honeywell</i> 104 keys	
MONITOR	<i>Philips</i> 105B 15" flat screen radiation SVGA	<i>Philips</i> 105B 15" flat screen digital MRPII	<i>Philips</i> 107S 17" flat screen digital MRPII	
MOUSE	3 button serial	3 button serial	3 button serial	
SYSTEM	Windows 95	Windows 95	Windows 95	
WARRANTY	2 Years parts 5 Years labour	2 Years parts 5 Years labour	2 Years parts 5 Years labour	
PRICE	\$1,900	\$2,900	\$4,650	

Specifications: Workstation PCs

Product	Dell WorkStation 400	Edge Personal Workstation	Gateway GP6-266	IPS Vision-98	Optima Vizon-LX	TPG ATX-Ultra Pentium II 300 Office
Distributor	Dell	Edge Technology	Gateway 2000	IPS	Optima Computer Technology	TPG
Phone	1800 812 393	(02) 9353 9200	1800 500 734	(02) 9923 1777	(02) 9841 2777	(02) 9850 0800
Price	\$10,495	\$3,665	\$3,698	\$5,290	\$4,295	\$4,995
Online	http://www.dell.com.au	-	http://www.gw2k.com.au	http://www.ipspty.com.au	http://www.optima.com.au	http://www.tpgi.com.au

Testing confirmation

Processor	Intel Pentium II MMX 300MHz	Intel Pentium II MMX 266MHz	Intel Pentium II MMX 266MHz	Intel Pentium II MMX 300MHz	Intel Pentium II MMX 300MHz	Intel Pentium II MMX 300MHz
RAM/type	128M/ECC EDO DRAM	64M/EDO	32M/SDRAM	64M/SDRAM	64M/SDRAM	64M/SDRAM
Secondary cache	512K	512K	512K	512K	512K	512K
Hard disk controller	Ultra Wide SCSI	UltraDMA	UltraDMA	UltraDMA	UltraDMA	UltraDMA
Hard disk size	2.1G	2.5G	2.1G	4.3G	6.4G	6.4G
Hard disk file system	NTFS	NTFS	NTFS	NTFS	NTFS	NTFS
Graphics adapter	ELSA GLoria-L/MX	Diamond Stealth 3D 2000	STB Velocity 128D/PCI	Number Nine Revolution 3D/AGP	nVidia 128	V3000 3DexPlover/AGP
Graphics RAM/type	8M/VRAM	2M/EDO DRAM	4M/SGRAM	4M/WRAM	4M/SGRAM	4M/SGRAM
Resolution/colour depth/refresh rate	1,024x768/256/60Hz	1,024x768/256/60Hz	1,024x768/256/60Hz	1,024x768/256/60Hz	1,024x768/256/60Hz	1,024x768/256/60Hz
CD-ROM drive	NEC CDR 1800 12x/24x	24x	Mitsumi 24x	Mitsubishi 24x	Pioneer 24x	Mitsubishi 24x
CD-ROM controller/cache setting	ATAPI/Windows	ATAPI/Windows	ATAPI/Windows	ATAPI/Windows	ATAPI/Windows	ATAPI/Windows
Operating system	Windows NT 4.0 Workstation	Windows NT 4.0 Workstation	Windows NT 4.0 Workstation	Windows NT 4.0 Workstation	Windows NT 4.0 Workstation	Windows NT 4.0 Workstation

Benchmark results

CD-ROM WinMark 97	1,390	1,396	1,276	1,460	1,620	1,580
CPU Mark32	748	691	680	782	774	753
Business Disk WinMark 97	1,230	1,116	956	1,300	2,540	1,110
High-End Disk WinMark 97	3,040	2,796	3,396	3,363	7,946	3,316
Business Graphics WinMark 97	98	28	120	135	139	112
High-End Graphics WinMark 97	41	30	53	62	58	56
Business Winstone 97: Overall	68	45	53	79	66	75
High-End Winstone 97: Overall	34	27	29	35	32	36

Features

Monitor	Dell Trinitron 17in	KTX 17in	Gateway CS 17in	Mitsubishi Trinitron 17in	Sampo Alpha Scan 711 17in	TPG 17in
Sound interface	Sound Blaster 16	Vibra 16	No	Sound Blaster AWE64	ESS 1869 3D	No
Speakers	Yes	Yes	No	Yes	Yes	No
Modem	US Robotics 33.6	No	No	No	No	No
Back-up device	No	No	No	No	No	No
Keyboard	Yes	Yes	Yes	Yes	Yes	Yes
Mouse	Yes	Yes	Yes	Yes	Yes	Yes
Network interface	3Com Ethernet 10/100TX	No	No	No	No	No
Bundled software	No	Lotus SmartSuite 97	Microsoft Office 97 Small Business Edition	Lotus SmartSuite 97 and Ultimate Games Pack	No	No
Warranty	3 years parts and labour	1 year parts and labour	3 years parts and labour	2 years parts and labour	3 years parts and labour	3 years parts and labour

Notes

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Corporate choices

The market for business PCs is caught in a transitional stage.

For years, improvements to PC technology have focused on making faster systems with more features for the same price. Although the applications these advances have enabled have continually increased sales of PCs, over the past few years the market has begun a fundamental shift towards simplicity. Driven by the talk surrounding stripped-down NetPCs and Network Computers (NCs), the new focus for many corporate customers is on reducing the cost of their IT infrastructure, while the rate of change in conventional PC systems remains rapid.

The arrival of thin clients may permanently change the face of the PC business. This is not likely to happen until such machines are more readily available and until IS managers are sure the NC path is the right one to take. IDC predicts that while the take-up of thin clients might not really begin for the next 18 to 24 months, the potential is significant. At the same time, proponents of the traditional Wintel PC design have argued that in many corporate environments, more, not less, desktop power is what is required, especially as com-

ponent prices have fallen so dramatically and improvements continue to be made.

The issue is further complicated by the corporate market for PCs being close to saturation point. In a recent report, *Why the PC Business is Becoming Obsolete*, IDC points out that with North American, European and Asian markets all at heavy levels of penetration, PC companies will need to change both their technology and sales strategies to maintain current success levels. "While excellent opportunities for selling PCs to the corporate market will continue, capturing those opportunities will require new approaches," the report said.

The end result of these changes has been that corporate systems have become increasingly diversified. Some have been re-engineered for easier manageability; some have been beefed up with multimedia features such as sound support and high-powered graphics cards; and others have retained the same basic specifications while dropping dramatically in price. This diversity is reflected in the systems APC has reviewed this year. More than ever, the precise configuration needed for maximum business benefit is something that must be decided on a case-by-case basis.

Is there any relief in sight from such changes? The expert consensus is yes, eventually. For instance, adoption rates for non-PC products such as NCs will grow

over the remainder of the century, removing uncertainty about their future.

Analysts also predict that the rapid rate of technological change will eventually slow. In the short term, users will continue to be dogged by shrinking technology cycles. However, in the long term, cycle times will again increase, much to the relief of everyone, said US Gartner Group vice-president and research director, Al Lill.

Within about five years, Lill believes, IT users will see better products with fewer incremental advances in technology, and that will mean fewer incremental versions. He said that technologies that are becoming increasingly complex require more time for testing before they are released.

"Over time, as things get very, very complex, [manufacturers] are going to have to do much more system testing, integrity testing and all that kind of stuff, and that simply will take more time," Lill said. There will be more time to get the product right, he said.

Until that happens, decisions about which products your organisation requires should be based on which vendors can provide 'good enough' products and also have a certain future. It is becoming more and more difficult to use current methodologies to determine whether a product will suit your organisation. "By the time you figure it out, the product is obsolete," said Lill. "Don't go for the best technology, because

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(URL): <http://mitac.mic.com.tw>

most of the best technologies will go away. The important thing is to go for the best vendors with good-enough technology.

"Pick any product at all or any technology and eventually it is copied, and so the technology itself will ultimately survive." The resulting product may not be all that great, he said, but it will do the job.

That pragmatic attitude is also reflected in the current crop of corporate machines. While there has been an increased emphasis on manageability as a central concern for corporate environments, there is still a large market for 'bread and butter' corporate desktops designed to fit into existing environments. Here we examine those low-end systems. For a review of the first NetPCs on the Australian market, see page 137.

What to look for

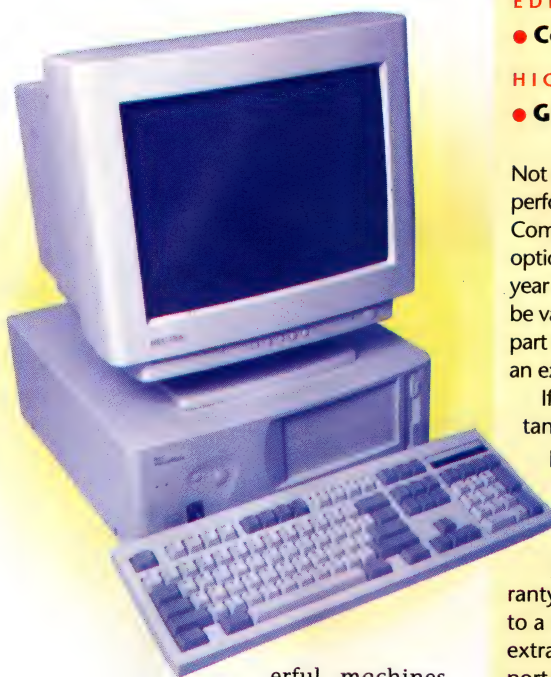
Bruce McCabe, an analyst with the Gartner Group/Dataquest, said the most important step when purchasing corporate desktop systems is to weigh up potential suppliers. "You should consider the size of the company, the breadth of its product line and the service infrastructure behind it, either from the vendor or from partners," he said. "It's also a big plus if you're talking to your server vendor, because this offers one point of contact for support as well as a unified management software solution."

He added that the cost of ownership is also an important factor. "It's all about a simple configuration that you can replicate. You want a streamlined operation that's not going to

cost you a lot of money in the long run.

"Scalability is important, as is the availability of desktop management solutions for that hardware."

McCabe's advice is to get the most pow-



erful machines you can afford, which does not necessarily mean the latest technology. "You'll often find that there is a premium associated with the most powerful machines out there, and there is a sharp price drop for machines one generation behind that," he said.

When it comes to operating systems, Gartner still recommends Microsoft Windows 95. "We're not recommending Windows NT as yet," said McCabe. "Windows 95 remains the best OS for corporate systems. In time, however, the emphasis is expected to move to NT."

What's on offer

The corporate system can be best described as a cheap PC on the desk. The minimum requirements we asked vendors to provide for the purpose of this review were: a processor rated at between 166 and 233MHz, 32M of RAM, a CD-ROM drive, 15in monitor, and a 10Mbps Ethernet adapter. As well, the total price for the system had to be less than \$2,500.

One system supplied did not meet this last requirement, coming in at \$3,000.

A corporate desktop system will by no means supply the user with the latest and greatest technology — it is typically conceived of as a grunt machine, designed to



EDITOR'S CHOICE

• Compucon Corporate Desktop

HIGHLY COMMENDED

• Gateway E-1000 166 MMX

Not only did it produce one of the best-performing machines in the review, but Compucon also provides excellent support options, including an insured onsite three-year warranty (so that the warranty will still be valid even if Compucon goes under) as part of the standard machine bundle. It's an excellent option for corporate buyers.

If price and support are more important to your business than processing power, then Gateway 2000's E-1000 166 MMX would be a good choice. It was the cheapest of the machines we tested and its price included a three-year warranty, onsite for the first year. Upgrading to a three-year onsite warranty is only an extra \$99. Its free lifetime phone support is another bonus. The low cost may not outweigh the system's poor performance, however.

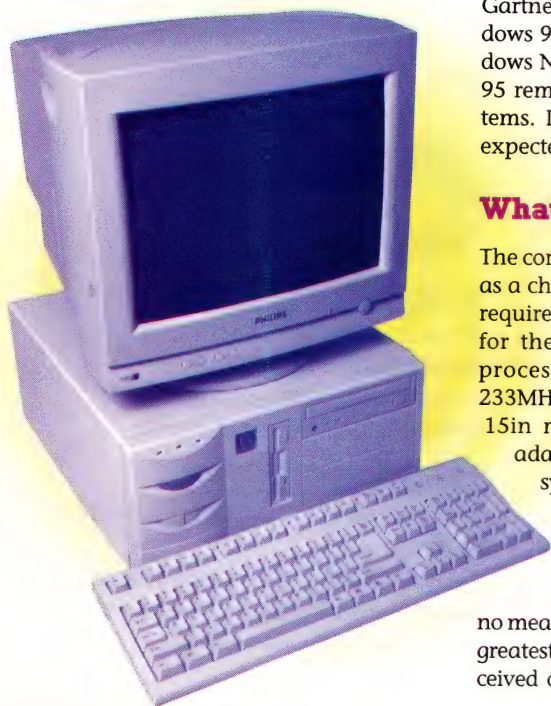
supply enough processing power and storage space to get the job done and nothing more. Most will not include the multimedia capabilities or communications devices noted in the workstations and consumer PCs reviewed here.

Or so we thought. In fact, nearly half of the systems we tested included a soundcard, and one even had an internal modem installed. Half of the graphics cards were relatively expensive 3D cards, which is probably unnecessary in a standard corporate machine.

All of the systems came with 32M of RAM and eight out of the 10 were supported by 512K of secondary cache (the other two had 256K). Processors ranged in speed from 166 to 233MHz. All were MMX-enabled. Just one system used an AMD processor; the rest were Intel Pentium based.

Hard drive size ranged from 1.6G up to 4.3G, with the majority hovering around the 2G mark. All the machines also sported the latest motherboard designs and were provided with UltraDMA disk controllers. Nine of the machines came with 24x CD-ROM drives.

Seven of the 10 machines met only the minimum specification of a 10Mbps Ether-





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Weighing up warranties

Benchmarks and specification details are only one consideration when purchasing a corporate system. In many cases the performance of the system will be overshadowed by the need for reliable and fast service options and onsite warranty provision, as well as total price per unit.

A realistic analysis of service provision is important in any purchase decision, but when your corporate bottom line is at stake, it is crucial. In the systems covered in this review, we found many options available. Although most are suited to businesses operating in the major capital cities, the larger vendors probably offer the best service in rural areas.

Here is a brief run-down of what each vendor has to offer:

Adelong Computers, based in Sydney, supplies a three-year insured onsite warranty with its corporate system, at an extra cost of \$150 per machine. Its offices are open to service calls from Monday to Friday, 9am to 5pm. The third party which provides the onsite service promises to be at your door within six working hours of the initial call. If you are based in a rural area, it may take longer, as the system would have to be sent to the nearest service location for repair.

Alpha Computer provides a good service to Melbourne customers, but others may pay extra for the same service. Customers in Melbourne who buy 50 PCs or more will receive a two-year onsite warranty at no extra cost. Others pay \$200 per unit for a three-year onsite warranty. The service is available 9am to 5:30pm, and someone will be onsite within 24 hours if you are based in a major centre. Those choosing to stick with the standard two-year parts and five-year labour warranty will need to arrange to get the machine to Alpha.

Also Technology offers a standard two-year parts, five-year labour, RTB warranty. This can be upgraded to a nationwide three-year onsite warranty for \$125 per PC. Also promises a 24-hour response time for its onsite services in Sydney and Melbourne, although it admits services to other locations will take more time. It also offers 24-hour nationwide phone support on a 1800 number.

Beyond Computers also offers a two-

year parts, five-year labour, RTB standard warranty, as well as a three-year onsite warranty for \$300. It claims response times of between 24 and 48 hours. Service centres are in Sydney and Melbourne, and calls are taken between 9am and 5pm. Phone technical support is only available through Beyond's Sydney office, and there is no local call or freecall service.

Busi-Soft Computer's standard warranty consists of a three-year parts and five-year labour contract which can be upgraded to a three-year onsite, next-day-response arrangement for \$160. This only applies to metropolitan Melbourne, Perth, Sydney, Adelaide and Brisbane.

Compucon was one of the few vendors providing an insured warranty. Its three-year onsite contract for major cities is included in the price of the system and it promises a four to eight-hour response time. The offices are open between 8:30am and 5:30pm. Those in remote locations may have to pay engineer travel costs.

Gateway 2000 offers a number of warranty options. Its standard warranty lasts for three years and is onsite for the first year. This can be upgraded to a three-year onsite Desktop Secure warranty for \$99. Those wanting blue-ribbon service can purchase the \$199 Premium Secure warranty, which provides priority response times. Lifetime nationwide technical support is also provided via a 1800 number.

NEC provides a standard three-year RTB warranty, and a one-year onsite warranty will cost \$60, or you can pay \$144 for three years. National technical support is available.

Optima Computer Technology provides a three-year RTB standard warranty, with nationwide phone support through a 1800 number. A three-year onsite warranty is available at a cost of \$295 for customers located in metropolitan NSW, and \$395 per unit for others.

TPG's onsite service warranties are worked out on a client-by-client basis, depending on the location of the client and the number of PCs purchased. Its standard warranty lasts three years. It provides its best support in capital cities.

ma's **Vizon Pentium P5** system came with Microsoft Windows NT 4.0 Workstation pre-installed. A standard 15in monitor was supplied with all the systems.

And despite the MIS dream of the ultra-

cheap corporate PC, most of the machines provided just scraped in under our \$2,500 price cap. The average price for systems was \$2,340. The cheapest models came from Gateway 2000 (**Gateway E-1000 166 MMX**, \$1,973), Also Technology (**Also Vogue P200MMX**, \$2,065), and Busi-Soft (**Busi-Soft Pentium Performance**, \$2,149). The rest ranged from \$2,370 to \$2,499. Obviously, these prices include many different options and service offers, so you need to read the details carefully before making any purchase decision.

Performance

Two machines logged impressive results on the performance front. The Alpha K6-233 MMX came first in the High-End Winstone 97 test and equal first in the Business Winstone 97 test. Given that the AMD processor is considerably faster than an Intel Pentium processor of the same speed, these results are not surprising. Some other impressive specifications also helped the machine beat the field, including the powerful Diamond Viper V330 graphics card with the nVidia Riva chip, a 512K cache and 32M of fast SDRAM.

The Alpha didn't get it all its own way, however. The Vizon Pentium P5 came equal first on the Business Winstone 97 test. Oddly enough, however, the Vizon failed to match up in the High-End Winstone 97 test, where it came last by a considerable margin. This mixed result demonstrates the importance of selecting a system (and processor) that matches your ongoing application needs, rather than choosing solely on base specifications. Also achieving good results in the Business and High-End Winstone 97 tests were the **Beyond SuperO Corporate Desktop** and the **Compucon Corporate Desktop**. The Beyond, with its 233MHz Intel Pentium with MMX processor (the highest speed Pentium processor in the review), provided the second highest benchmark scores, while the Compucon used a 200MHz Intel Pentium MMX processor to achieve its scores.

One of the more curious results was for the **Vizon Pentium P5**, which came second in the Business Winstone 97 test, but last in the High-End Winstone 97 test by a considerable margin.

Not surprisingly, the cheapest system in the review also provided one of the lowest performance levels. The **Gateway E1000 166MMX** used, as the name implies, a 166MHz Intel Pentium processor. Other performance factors included a smaller cache than most of the other systems (256K) and a rather low-end graphics chip (the S3 Trio 64V+) with only 2M of video memory.

net card; the remainder took the next step and supplied a 100Mbps Fast Ethernet card.

None of the machines had any bundled software; all but one came installed with Microsoft Windows 95 (revision B). Opti-

Specifications: Corporate PCs

Product	Compucon Corporate Desktop	Gateway E-1000 166 MMX	NEC ValueMate	Optima Vizon Pentium P5-233MHz MMX	TPG Pentium 200MMX Office
Distributor	Compucon	Gateway 2000	NEC	Optima Computer Technology	TPG
Phone	(02) 9417 7166	1800 500 734	131 632	(02) 9841 2777	(02) 9850 0800
Price	\$2,499	\$1,973	\$2,499	\$2,370	\$2,495
Online	http://www.compucon.com	http://www.gw2k.com.au	http://www.nec.com.au	http://www.optima.com.au	http://www.tpgi.com.au

Testing configuration

Processor	Intel Pentium MMX 200MHz	Intel Pentium MMX 166MHz	Intel Pentium MMX 200MHz	Intel Pentium MMX 233MHz	Intel Pentium MMX 200MHz
RAM/type	32M/SDRAM	32M/SDRAM	32M/EDO DRAM	32M/SDRAM	32M/EDO DRAM
Secondary cache	512K	256K	256K	512K	512K
Hard disk controller	UltraDMA	UltraDMA	UltraDMA	UltraDMA	UltraDMA
Hard disk size	4.3G	2G	3.2G	2.1G	2.1G
Hard disk file system	FAT32	FAT32	FAT16	FAT32	FAT32
Graphics adapter	WinFast 3D S600DX	S3 Trio 64V+	Cirrus Logic 5446	S3 Virge 3D	S3 Virge 3D
Graphics RAM/type	2M/DRAM	2M/DRAM	1M/DRAM	4M/EDO DRAM	4M/EDO DRAM
Resolution/colour depth/refresh rate	1,024x768/256/60Hz	1,024x768/256/60Hz	1,024x768/256/60Hz	1,024x768/256/60Hz	1,024x768/256/60Hz
CD-ROM drive	Matsushita 24x	Mitsumi 12x/24x	N/A	Diamond Data 24x	Mitsubishi 24x
CD-ROM controller/cache setting	ATAPI/Windows	ATAPI/Windows	N/A	ATAPI/Windows	ATAPI/Windows
Operating system	Windows 95B	Windows 95B	Windows 95B	Windows NT 4.0 Workstation	Windows 95B

Benchmark results

CD-ROM WinMark 97	1,290	1,270	N/A	1,470	1,350
CPUMark32	406	344	361	457	404
Business Disk WinMark 97	1,080	667	832	871	937
High-End Disk WinMark 97	4,006	2,056	2,570	1,960	3,193
Business Graphics WinMark 97	82	66	57	62	81
High-End Graphics WinMark 97	36	28	18	33	33
Business Winstone 97: Overall	47	40	39	50	45
High-End Winstone 97: Overall	19	17	18	15	17

Features

Monitor	View Excel 15in	Gateway CS500 15in	NEC ISA 15in	Optima 15in	TPG 15in
Sound interface	No	Crystal 16	No	ESS 1869	No
Speakers	No	No	No	Yes	No
Modem	No	No	No	No	No
Keyboard	Yes	Yes	Yes	Yes	Yes
Mouse	Yes	Yes	Yes	Yes	Yes
Network interface	Intel EtherExpress	AMD Fast Ethernet 10/100 PCI	3Com FastEtherlink 10/100	DLink PCI 10Mbit	Intel EtherExpress Pro Fast 10/100
Bundled software	No	No	No	No	No
Warranty	3 years parts and labour	3 years parts and labour	3 years parts and labour	3 years parts and labour	3 years parts and labour

Notes

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Specifications: Corporate PCs

Product	ADE Advantage P200 MMX	Alpha K6-233 MMX	Also Vogue P200MMX	Beyond Super0 Corporate Desktop	Busi-Soft Pentium Performance System
Distributor	Adelong Computers	Alpha Computer	Also Technology	Beyond Computers	Busi-Soft Computers
Phone	1800 626 345	(03) 9415 9177	(02) 9519 4600	(02) 9417 3688	(03) 9890 8900
Price	\$2,450	\$2,450	\$2,065	\$2,450	\$2,149
Online	http://www.adelong.com.au	http://www.alpha.com.au	http://www.alsotech.com.au	http://www.beyondcomputers.com.au	http://www.busi-soft.com.au

Testing configuration

Processor	Intel Pentium MMX 200MHz	AMD K6/233 MMX 233MHz	Intel Pentium MMX 200MHz	Intel Pentium MMX 233MHz	Intel Pentium MMX 166MHz
RAM/type	32M/SDRAM	32M/SDRAM	32M/SDRAM	32M/SDRAM	32M/SDRAM
Secondary cache	512K	512K	512K	512K	512K
Hard disk controller	UltraDMA	UltraDMA	UltraDMA	UltraDMA	UltraDMA
Hard disk size	3.2G	4.3G	2.1G	2.1G	1.6G
Hard disk file system	FAT16	FAT32	FAT32	FAT32	FAT32
Graphics adapter	Diamond Viper V330	Diamond Viper V330	Matrox Mystique	Matrox Mystique II	Diamond Stealth 3D 2000 Pro
Graphics RAM/type	4M/SGRAM	4M/SGRAM	2M/SGRAM	4M/SGRAM	4M/EDO DRAM
Resolution/colour depth/refresh rate	1,024x768/256/60Hz	1,024x768/256/60Hz	1,024x768/256/60Hz	1,024x768/256/60Hz	1,024x768/256/60Hz
CD-ROM drive	Panasonic 24x	Mitsumi 24x	Sony 24x	LG 24x	Panasonic 24x
CD-ROM controller/cache setting	ATAPI/Windows	ATAPI/Windows	ATAPI/Windows	ATAPI/Windows	ATAPI/Windows
Operating system	Windows 95B	Windows 95B	Windows 95B	Windows 95B	Windows 95B

Benchmark results

CD-ROM WinMark 97	1,300	1,390	1,110	1,290	1,340
CPUMark32	417	526	398	441	375
Business Disk WinMark 97	1,240	1,136	965	1,213	1,180
High-End Disk WinMark 97	4,076	3,506	2,960	3,816	3,883
Business Graphics WinMark 97	99	111	88	90	87
High-End Graphics WinMark 97	43	47	39	43	38
Business Winstone 97: Overall	46	50	44	48	44
High-End Winstone 97: Overall	19	22	19	20	18

Features

Monitor	Samsung 15in	Philips 105S 15in	AcerView 54e 15in	LG Studioworks 57i 15in	Philips 105S 15in
Sound interface	Vibra 16	No	Sound Blaster 16	No	No
Speakers	Yes	No	Yes	No	No
Modem	No	No	Hightech 33.6K internal	No	No
Keyboard	Yes	Yes	Yes	Yes	Yes
Mouse	Yes	Yes	Yes	Yes	Yes
Network interface	PCI Ethernet	PCI Ethernet	DLINK PCI 10Mbit	Intel EtherExpress	Intel EtherExpress
Bundled software	No	No	No	No	No
Warranty	3 years parts and labour	2 years parts, 5 years labour	2 years parts, 5 years labour	2 years parts, 5 years labour	2 years parts, 5 years labour

Notes

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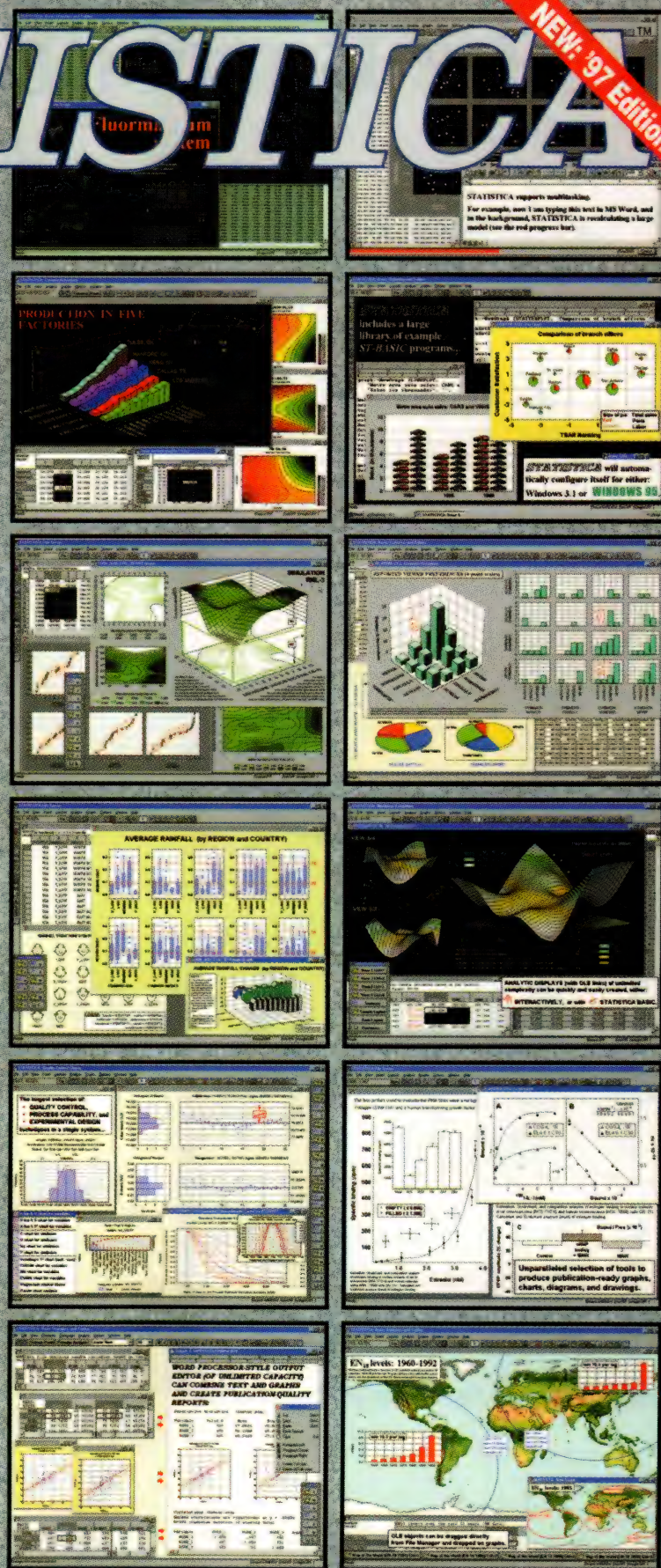


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NetPCs face the test

Total cost of ownership (TCO) has become a major issue in the past year for corporations that utilise PCs. The discussion has been fuelled primarily by the emergence of network computers (NCs), which claim lower deployment and maintenance costs than conventional PCs. Figures from the Gartner Group suggest that a typical PC has an annual TCO of about \$US9,800, while an NC would have an annual TCO of around \$US6,000. That saving represents the major appeal of NCs over PCs.

In response to this perceived threat, Microsoft and Intel proposed a standard to cut down on the TCO of standard Wintel systems. The specification was originally called the NetPC Reference Platform (later to be modified, finalised and called the NetPC Specification). NetPCs occupy the middle ground between stripped-down NCs and full-blown PCs; Gartner estimates an annual TCO of \$7,300 per year.

The introduction of the specification was followed by announcements from a gamut of PC manufacturers supporting the standard. Now, more than a year after all the hype and argument first began and six months after the specification was finalised and the first prototypes put on show, NetPCs are finally beginning to appear on the market. APC examined three such systems from Compaq, Hewlett-Packard and Siemens Nixdorf. Dell has also released a NetPC, but could not get a unit to us in time for review.

In essence, a NetPC is very similar to a standard corporate PC. The major differences are the lack of floppy and CD-ROM drives, and mandatory support for the various manageability features found in the NetPC specification (although most of the corporate PCs from these companies also support such features).

Perhaps the most interesting thing to note about these three systems is their similarity to each other. Their specifications are tightly bound to the detailed NetPC specification, leaving little room for differentiation between the products from the various vendors. Only price, level of support and a few relatively minor features distinguish the products.

The standard features of the NetPC specification include support for local and network booting of the device, Wake on LAN capabilities so the system can be



switched on over the network, ACPI power management, and DMI 2.0 compliance for management of the system. All the machines received by APC meet these requirements. Two of the devices also have optional smart-card readers for user identification and authentication.



These machines are not 'thin' clients, nor are they computing powerhouses (although Dell is planning to release a higher-speed model early next year). All three systems we examined used mid-range MMX and non-MMX Pentium processors ranging between 166 and 233MHz.

Obviously, this kind of power is more than adequate to handle most common desktop applications, such as Web browsers and office suite components. Higher end applications, such as CAD or DTP, should still be reserved for higher power desktop machines.

Nathan Taylor

Compaq Deskpro 4000N

COMPAQ

Compaq claims to have been the first company to meet the full NetPC specification (although Siemens has had a product that meets the 'Reference Platform' out for some time). APC took a look at what Compaq has on offer in a preview in Compaq's Sydney office.

The appearance of the Compaq Deskpro 4000N is like the other two NetPCs we looked at: a nondescript slimline case that could be used to prop up a monitor. As the specification requires, there is no floppy or CD-ROM drive in the case (so the front consists only of a power switch and several LEDs), and the case can be sealed to prevent tampering. The back of the box has the usual profusion of ports, though, with full support for USB, parallel and serial connections. Internally, there is also a PCI slot for one extra device to be added to the Deskpro, such as a soundcard (the Compaq does not have sound built in).

The processing power of the Compaq, like that of the other NetPCs, is in the midrange, with enough power to drive most office applications but certainly not enough to do any high-end DTP or CAD work. A range of Pentium MMX processors, from 166 to 233MHz, are available in the device. Thirty-two megabytes of main memory is supplied as standard with the machine, as is a 256K level 2 cache. The graphics chip is a low-end S3 Trio 64 V2 Enhanced with 2M of graphics memory, and the hard disk ranges in capacity from 1.6G to 2.1G. Fast Ethernet support is also packaged with the system.

The device normally ships with Windows NT and Compaq management software for DMI compliance. As required in the specification, network boot, Wake on LAN, remote system installation and ACPI are all supported. Also supported by the BIOS are various security features which can provide lock-downs on certain system features (such as ports), power-on password support and memory change alerts.

■ Distributor	Compaq
■ Phone	(02) 9911 1999
■ Online	http://www.compaq.com.au
■ Price	166MHz with 1.6G hard disk \$2,044; 200MHz with 1.6G hard disk \$2,245; 233MHz with 2.1G hard disk \$2,595

Hewlett-Packard netVectra PC

HEWLETT-PACKARD

Unlike its competitors, HP is pushing this product at more than just Microsoft networks. The netVectra is advertised as 'NetPC ready' rather than simply a NetPC (the 166MHz model does meet all the requirements of the specification), and HP claims that the product is certified to run on Novell and DEC Pathworks networks as well as Microsoft networks.

In spite of this, the configuration of the system is very similar to that of the other NetPCs in this review. It comes with a mid-range processor (a 200MHz Pentium or 166MHz Pentium with MMX), a 256K level 2 cache, a 1G or 1.6G hard disk and an Ethernet NIC (10BaseT for the Pentium 200MHz model, 10/100BaseT for the 166MHz MMX model). The netVectra is available in a 16M SDRAM configuration (which is fairly useless if you plan to be running Windows NT 4.0) or a 32M SDRAM model. It uses the S3 Trio 64 V2 graphics chip with 2M of video memory — seemingly a popular choice in NetPCs, as it is used in Compaq's and Dell's NetPCs as well.

It supports all the usual NetPC features, including network boot, DMI 2.0, Dynamic Host Configuration Protocol, ACPI and Wake on LAN. In addition, it comes pre-installed with HP's own management tools: HP TopTOOLS 2.2, HP NightDIRECTOR and HP Lock. Obviously, HP prefers the use of OpenView for network management, and the netVectra has all the software required to be an OpenView client.

Like the Siemens Nixdorf machine, HP offers an optional smart-card reader

(which APC did not receive), in this case to be embedded in the keyboard. According to HP, this can be used for user identification and authentication, and is useful when user configurations are stored on a server (using the Windows ZAK, for instance.)

■ Distributor	Hewlett-Packard
■ Phone	131 347
■ Online	http://www.hp.com.au
■ Price	Ex tax (no RRP available): 200MHz with 16M of RAM and 1G hard disk \$1,838; 166MHz MMX with 32M of RAM and 1.6G hard disk \$2,100

Siemens Nixdorf SCENIC Pro Net S

SIEMENS NIXDORF

Siemens Nixdorf was one of the first companies to release a NetPC, originally launching it at CeBIT this year. The preview model received by APC met the original NetPC Reference Platform, but not the full specification (1.0b), but Siemens has since re-engineered the product to conform with the specification. Make sure it is this latter model you are getting if you plan to buy a Siemens SCENIC Pro Net S (the model name has not changed between versions).

The old version of the SCENIC Pro Net S used a non-MMX Pentium processor running at clock speeds of between 133 and 200MHz, EDO RAM, a 10Mbps Ethernet combo card (with remote boot options in BIOS) and a Cirrus 5446 graphics controller with just 1M of video RAM. It had proprietary power management and lacked several of the system management

features available in the newer model. A hard disk was optional.

The present model sports an MMX Pentium processor with speeds of between 166 and 233MHz, uses SDRAM, is supplied with a 1.6G or 3.2G hard disk drive and utilises the more powerful Matrox Mystique processor with 2M of SGRAM for graphics processing. Also supplied in the new configuration are two additional PCI slots (the original model only had one free; this one has two), a 10/100BaseT fast Ethernet chip and integrated audio processing. The slimline case of the SCENIC Pro can also be turned on its side to suit the desktop layout.

More importantly, the new model supports all the management standards designed to cut down on TCO, such as DMI 2.0, system monitoring and Wake on LAN. It also supports ACPI power management and OnNow, which were lacking in the original NetPC Reference Platform.

One differentiating feature of the Siemens device is the optional smart-card reader. The reader, which takes the form of a small slot in the case, can read Siemens' proprietary smart cards to access security and configuration information about a particular user. Also available from Siemens is an expansion box which can be plugged into the back of the NetPC. The expansion box can have an LS-120 drive and/or CD-ROM drive installed, giving the SCENIC Pros access to these media types.

■ Distributor	Siemens Nixdorf
■ Phone	1800 643 870
■ Online	http://www.sni.com.au
■ Price	Expected to be priced between \$1,100 and \$1,200

Specifications: NetPCs

Product	Compaq Deskpro 4000N	Hewlett-Packard netVectra PC	Siemens Nixdorf SCENIC Pro Net S (new model)
Distributor	Compaq	Hewlett-Packard	Siemens Nixdorf
Phone	(02) 9911 1999	131 347	1800 643 870
Online	http://www.compaq.com.au	http://www.hp.com.au	http://www.sni.com.au
Price	166MHz with 1.6G hard disk \$2,044; 200MHz with 1.6G hard disk \$2,245; 233MHz with 2.1G hard disk \$2,595	Ex tax (no RRP available): 200MHz with 16M RAM, 1G hard disk \$1,838; 166MHz MMX with 32M RAM, 1.6G hard disk \$2,100	Expected to be priced between \$1,100 and \$1,200
Processor	Pentium MMX, ranging from 166 to 233MHz	Pentium 200MHz (non-MMX) or Pentium MMX 166MHz	Pentium MMX, 166 to 233MHz
Memory standard/maximum and type	32M/256M SDRAM, 256K L2 cache	16M or 32M/192M SDRAM, 256K L2 cache	32M/256M SDRAM, 256K L2 cache
Hard disk size and type	1.6G or 2.1G EIDE	1.0G EIDE or 1.6G Ultra ATA/33	1.6G or 3.2G EIDE
Graphics controller and RAM	S3 Trio 64 V2/GX enhanced with 2M SGRAM	S3 Trio 64 V2 with 2M EDO DRAM	Matrox Mystique with 2M SGRAM
Network interface controller	10/100BaseT Ethernet	10/100BaseT Ethernet	10/100BaseT Ethernet
Number of PCI slots available	1	1 (1 already taken by NIC)	2
I/O ports	1 parallel, 2 serial, 2 USB	1 parallel, 1 serial, 2 USB	1 parallel, 2 serial, 2 USB
Smart-card reader	No	Optional with keyboard	Optional
Meets NetPC specification (including support for network boot, Wake on LAN, ACPI, DMI)	Yes	Yes	Yes

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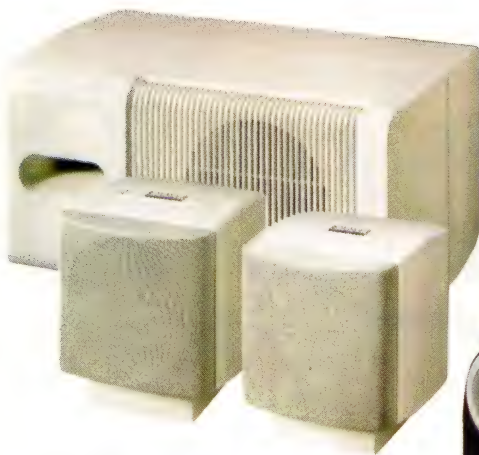
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Christmas shopping and need some help? We combed the aisles of a local software outlet and found some real crackers. By Cathie Kennedy

Santa's little helpers

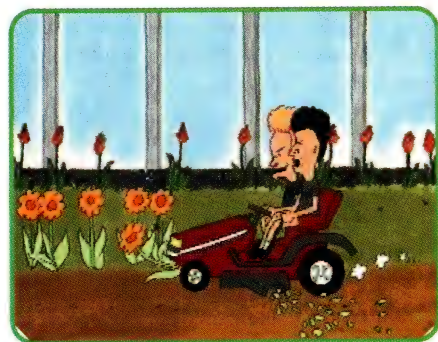
A PC has been shopping for stocking fillers, and we've found something for everyone. We set a limit of \$150 for each package, but as you'll see, like all good Christmas shoppers we managed to blow the budget more than once.

Beavis and Butt-head Multimedia Screensaver

Featuring a series of multimedia screen saver, wallpaper and clock clips, this \$49 multimedia CD includes 80 video clips pulled directly from the MTV series, four music videos, and 75 sound effects.

Beavis and Butt-head are up to their usual vulgar antics, including working at "The Golden Ws", making mouse burgers and French fries (extra crispy) for unsuspecting customers.

The Alice Cooper 'Lost in America' video clip screen saver is a classic, interspersed with Beavis and Butt-head's sick and twisted views. Crass, crude and bullish, Beavis and Butt-head fans will think this is cool stuff, dude.



Collier's Encyclopedia 1998

Time for some serious presents. New from Sierra is Collier's Encyclopedia 1998 Multimedia Edition, which has over 24,000 articles, 18,000 photos and illustrations and nearly 700 maps.

The CD's Internet capabilities automati-



cally link you to over 500,000 Web sites containing further information. As far as we are aware, Britannica is the only other encyclopedia to offer this functionality.

You can search by word or concept using the Excalibur search engine, which uses semantic search capabilities to find all related articles. The interactive learning feature covers topics such as geography, music, economics, physics, chemistry, geology, archaeology and physical fitness.

While Collier's is not as extensive as Encyclopaedia Britannica, its Web links provide an abundance of additional information. And at \$89.95, it's less than one-third the price, even after Britannica's recent price decrease.

Home and Garden

Wannabe architects and landscape gardeners will delight in Sierra's Home and Garden, an online guide to home remodeling and design, gardening and landscaping. Templates help you create your designs, or the more confident can start from scratch. In addition to designing plans for renovating or building your home, you can experiment with furniture arrangements, trial colours and fabrics, and even eye the different effects of various floor coverings. And if you're *really* serious, designs can be exported in DFX format for use in CAD software programs.

The Garden package allows you to landscape your garden and see how it will look during the four seasons, and how it will grow over time. You can also learn how to grow and care for fruit, vegetables and herbs, and even design a sprinkler system.

If you buy Home and Garden as a present, remember it's great to plan, but someone has to do the labour...

Jedi Knight: Dark Forces II

Jedi Knight: Dark Forces II is the recently-released sequel to the first Star Wars title. The game continues with Kyle Katarn, a young mercenary sent to infiltrate the Empire, who embarks on a quest to understand his past and learn the mysterious ways of the Jedi. Will he stop seven evil Jedis from unlocking the powers of a hidden Jedi burial ground? Is his destiny the dark side or the light side?

Diehard 'Star Wars' fans will gleefully spend Christmas Day battling the evil Galactic Empire, wielding the new lightsaber and gaining strength through the use of the Force. The fate of the galaxy (but unfortunately not the Christmas turkey) will be in their hands.

MasterPublisher 97

MasterPublisher is an ideal desktop publishing solution for SOHO users, and includes 500 templates, 20,000 clip-art images, 2,000 fonts and 1,000 borders. It also includes a drawing, illustration and editing tool for customising imported art and creating your own designs and logos. A Web publishing utility helps you publish reports and books directly onto the Internet.

Those new to desktop publishing will benefit from the templates and Page Pilots (similar to Microsoft Wizards) that help create brochures, newsletters, fliers, stationery and proposals.

At \$99.95, MasterPublisher is an affordable solution for low-end desktop publishing requirements. Just keep your fingers crossed it isn't used to create a 'wow what a year it's been' friends and family newsletter next Christmas!

Microsoft Home Essentials 97

If your first family PC is under the Christmas tree this year, you can't go past a copy of Microsoft Home Essentials 97. Packed with everything you need to start computing, the suite includes Word, Internet Explorer and Works (spreadsheet, database and drawing tools). It is also bundled with Encarta 97 World Atlas and Encyclopedia; Greetings Workshops for creating cards, invitations and certificates; Microsoft Arcade games; as well as a range of fonts and clip art.

The only obvious omissions are a personal finance package such as Money 97, particularly given Home Essentials' target market, and a free trial period with an Internet Service Provider.

Still, at \$169 it represents a good buy and is only a little over the \$150 budget. There's bound to be something of use for all the family.

NetAccelerator

Here's one for friends and family who regularly surf the Internet. NetAccelerator is a \$49.95 utility that improves Internet browser and modem efficiency.

While you're reading a retrieved page, NetAccelerator clicks all the links on the page you are viewing and downloads them in the background, storing the links until you click to view them. Unlike some of its competitors, this title includes look-ahead caching of both text and graphics, ensuring

you will see the entire page the moment you click on the link.

Caveat emptor: NetAccelerator will not speed up your Internet access if you skim pages and click on links quickly, as it relies on you spending time browsing so it can download all the linked pages.

NetAccelerator supports both Internet Explorer and Netscape Navigator, and works with standard modems, ISDN and direct network connections.

Norton Utilities Version 2.0 and Norton AntiVirus

Perhaps it's not the most exciting Christmas present, but no computer owner should be without a copy of Norton Utilities and some form of virus protection.

Norton Utilities offers prevention, recovery, performance and diagnostics programs. The latest version also helps detect viruses including Word macro viruses.

Those who have braved Windows Registry will appreciate the new Registry Tools, an editor with multilevel Undo, Search and Replace, and an Advisor that explains the functionality behind each Registry entry.

Norton AntiVirus is one of the most pop-

ular virus detection packages on the market. It includes free monthly virus definition updates that can be downloaded from the Symantec's Web site, ensuring you always have the latest protection. Help someone prevent their computer from contracting just one virus and it will be the best \$99 present you've purchased.

pcANYWHERE Version 8.0

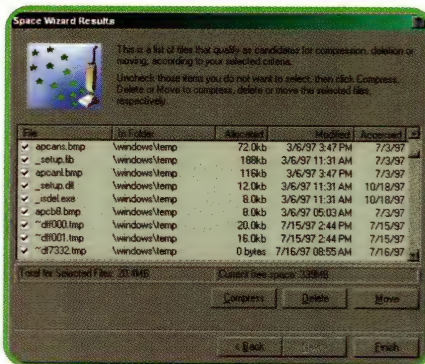
It was with some reluctance that APC included pcANYWHERE in this roundup. Christmas should mean holidays, not finding a way to stay in contact with the office.

An oldie but a goodie, pcANYWHERE allows you to remotely access your office



PC or network via modem or via the Internet. It can automatically make the connection and launch a program that lives on your work computer. You can remotely control your work PC, or automatically transfer files and synchronise folders between two PCs.

This is definitely for someone who never leaves home without their laptop, mobile phone, pager and personal organiser. At \$239, it's slightly above our stocking filler budget, but the perfect gift for a workaholic. ■



Roundup

Product	Distributor	Phone	Price	Online
Beavis and Butthead	George Sherman	(02) 9362 0043	\$49	http://www.starpress.com
Collier's Encyclopedia 1998	Playcorp	(03) 9329 2999	\$89.95	http://www.sierra.com
Home and Garden	Playcorp	(03) 9329 2999	\$59.95	http://www.sierra.com
Jedi Knight: Dark Forces II	Playcorp	(03) 9329 2999	\$89.95	http://www.lucasarts.com
MasterPublisher 97	Dataflow	(02) 9417 9700	\$99.95	http://www.imsisoft.com
Microsoft Home Essentials 97	Microsoft	(02) 9870 2200	\$169	http://www.microsoft.com
NetAccelerator	IMSI	(02) 9319 7533	\$49.95	http://www.imsisoft.com
Norton AntiVirus	Symantec	(02) 9850 1000	\$99	http://www.symantec.com
Norton Utilities	Symantec	(02) 9850 1000	\$120	http://www.symantec.com
PcANYWHERE	Symantec	(02) 9850 1000	\$239	http://www.symantec.com

A quick guide to some of the packages on this month's bonus shareware CD.

Top 200 downloads

As a special Christmas bonus, this month APC is offering not one, but two, **apcmag.cd** cover discs. As well as our regular CD, featuring demo versions of applications discussed in this issue and a full selection of Internet software for all the major desktop platforms, we've also included an extra disc featuring our selection of the 200 best shareware, freeware and trialware applications available.

You can find a complete listing of all the software featured on the bonus CD on page 12. Here, we've listed some of the highlights from each of the 10 categories of software included on the disc.

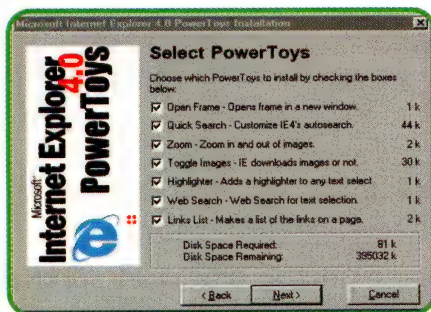
Complete installation instructions and information about these packages can be found on the CD. Simply open the DEFAULT.HTM file in your favourite Web browser and click on the links until you find the file you want.

Also, remember to respect the shareware principle. If you install a shareware package and find it useful, you are obliged to pay the registration fee to the program's author. Shareware authors rely on your honesty for their income.

Internet and network

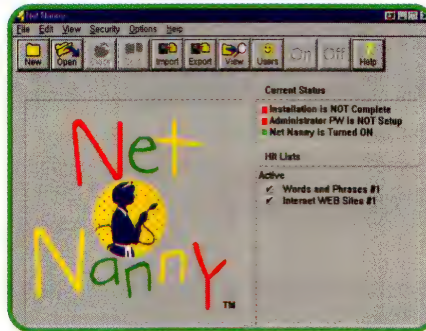
Internet Explorer 4.0 PowerToys

With Internet Explorer 4.0 PowerToys you can play with the latest add-ons from Microsoft's IE developers.



Net Nanny 3.1

Net Nanny is an access control utility that allows the user to monitor, screen and block access to anything on a PC or the Net.



Net.Medic 1.2.2

A network information tool designed to monitor the throughput and compression that occurs with an Internet connection in real time.

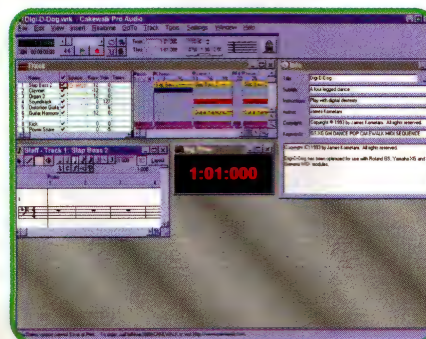
Multimedia and design

Adobe Photoshop 4.01

This graphics editor for graphic designers, Webmasters and photographers allows users to create original images, correct colour, retouch and composite scanned images and prepare professional quality separations and electronic output. The product includes painting and selection tools, multiple layers, special effects filters and lighting effects.

Cakewalk Pro Audio 6.0

A MIDI and digital audio workstation for professional music and sound production on the PC. With Cakewalk Pro Audio it is possible to record, edit, process and mix complete multitrack MIDI and audio projects.



Paint Shop Pro 4.12

Paint Shop Pro 32-bit is a Windows graphics program for image creation, viewing and manipulation. Some of the features include painting with eight brushes, photo retouching, scanner support and batch conversion.



Xing MPEG Player 3.12

Xing's complete MPEG playback functionality and high-powered Xing MPEG driver are included in this 30-day trial version.

Programming and Web editing

Adobe PageMill 2.0

Adobe PageMill is an HTML editor that includes all the tools needed to create a professional-looking Web site for business enterprises.

HotDog Pro 4.01

Sausage Software's HotDog Pro is a fully configurable HTML editor that supports channel technology and IE4 browser tags with a lot of add-on software.

Desktop and shell tools

After Dark Online 2.01

The latest version of the popular screen saver has an automatic news delivery service that broadcasts news directly to your desktop.

An aerial night view of a city, likely Sydney, with a glowing digital overlay that resembles a circuit board or data network. The word 'SUBSCRIBE' is written vertically in large, white, serif capital letters along the left edge of the image.

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Subscribe to the three-in-one APC and Save up to 30%

APC Magazine, Australia's top selling computer magazine, is comprised of three distinct components

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2. apcmag.com

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Among its most useful features are:

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- Back issue articles search and retrieval
- Up-to-the minute news and trends analysis
- Dynamic opinion columns and reader forums
- Reader reviews and comments on articles

3. apcmag.cd

The CD-ROM which is delivered with every issue of the paper version of APC has three main aims:

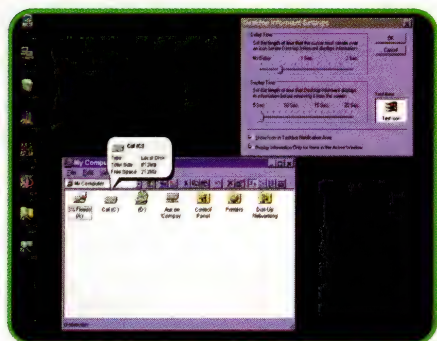
- To provide easy, fast access to all the files and resources we talk about in APC to save you download time and money.
- To make it easy for our readers to get on the Internet so they can use our interactive Web site.
- When you read about a program in the magazine, such as a piece of software from our Shareware column, you need only insert apcmag.cd, browse it with your favourite WWW browser, and download the file directly from the CD.



Source code: 97APDE

Desktop Informant 2.0

The Desktop Informant is a shell enhancement utility that displays the detailed file information in Windows 95. If you hold the cursor over the file's icon, Desktop Informant will display all available details for that file.



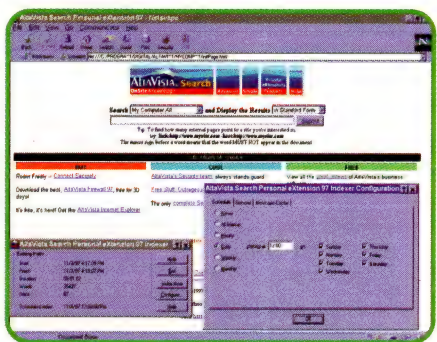
GoMac 1.1

Add a taskbar, just like Windows 95's, to your Macintosh desktop.

File management tools

AltaVista Search Personal eXtension 97 1.1

This is a personal version of the Web's AltaVista search engine for your PC. It offers search and retrieval capabilities for over 200 types of information stored on your PC's hard disk, file servers, Microsoft Exchange servers and email clients.



CleanSweep 3.0

CleanSweep cleans your hard drive by removing duplicate files, redundant DLLs and infrequently used files.

UnInstaller 4.0

With UnInstaller you can delete, move, archive and transport applications.

WinZip Self-Extractor 2.1

WinZip Self-Extractor creates self-extracting or self-installing zip files.

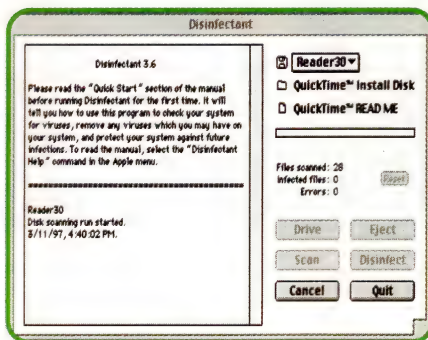
System tools

CPU Indicator 1.1

The CPU Indicator shows Win 95 CPU usage (it lets you know which application is causing the computer to crawl). It allows you to see a CPU usage chart from a pop-up menu, or you can hide the chart and monitor CPU usage via an icon in the Taskbar tray.

Disinfectant 3.6

Disinfectant is an anti-virus program for the Mac that has a wide range of features.



Thunderbyte Anti-Virus 8.03

Thunderbyte is an Australian-developed antivirus product for both Windows 95 and Windows 3.x.

Home and relaxation

Greatest Paper Airplanes 1.0g

Using interactive 3D animation, Greatest Paper Airplanes shows you how to fold paper aeroplanes. Screens using sound effects and fun animations guide you through the history of flight.

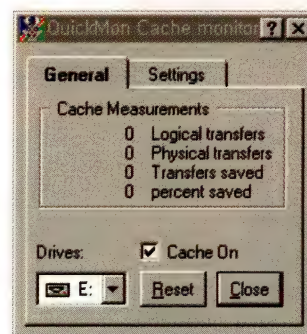
Plan a Meal 1.4

Plan a Meal is a recipe application that provides a place to store, sort and print your recipes and a calendar to assign one recipe to each day.

Utilities

CD-Quick Cache 2.01

CD-Quick Cache will dramatically speed up and increase the performance of your CD-ROM drive by storing frequently read sectors in either fast RAM or on your hard drive. Disc reads become almost instantaneous.



Turbo Browser 97 5.3.3.15

Turbo Browser can replace Explorer and a raft of utilities with one compact, integrated program. The latest update supports ActiveX WYSIWYG HTML and Office 97 document viewing.

Education and kids

3D Movie Maker 1.0

3D Movie Maker is a Microsoft entertainment program that lets you make 3D movies with 3D animation. The program features easy-to-use 3D tools and graphics, and a host of useful movie-making tips.

Musical Tutorial

Music Tutorial can be used for beginners or more advanced students to help them with their music theory. The program's repertoire can be modified to any instrument even though it was originally designed for piano.

Business tools

Visual Business Cards 2.1a

Visual Business Cards is a professional-quality business card design and printing program.



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Get involved

All files mentioned in Workshop can be found on **apcmag.cd** or downloaded from our Web site at **apcmag.com**. Here you will also find an online discussion forum where you can discuss technical issues or hardware problems, or just voice your opinion on any related topic.

Don't forget that Workshop is a reader-input section. Feel free to contact us by sending any ideas, comments or criticisms you have. You can email us at **workshop@acp.com.au** or send snail mail to APC Workshop, PO Box 37, Sydney NSW 1028.

Ashton Mills, Workshop editor

Welcome to Workshop, the section dedicated to bringing you all manner of tips, interesting information and do-it-yourself tutorials. Within these pages you will find useful shareware, informative operating-system-specific columns and easy-to-follow programming tutorials.

From now on you'll find the Bug of the Month winner listed on this page, providing a little extra space for Michael Smith's Developers Corner discussions each month.

As with last month, the Shareware Summary page is at the end of Workshop. This page will be expanding to include top shareware of the month and selections of must-bookmark shareware sites for each OS.



Bug of the Month

This month's bug is from Brad Evans of Realtime Computing. That's particularly poignant as the bug is a trap for developers of real-time software.

In Windows 95, double-click on the Taskbar over the displayed time. You will see the dialog entitled 'Date/Time Properties'. Modify the date, but do not press OK or Apply.

Open a DOS session and type 'date'. The modified date is displayed. Place the mouse cursor over the time on the Taskbar and leave it there. Again the modified date is displayed. Press Cancel in the Date/Time Properties dialog and the date returns to its previous value. It seems that the system date is modified as you type it. Interestingly, this does not happen with time, only date.

Changing the date while running real-time software is always a little dangerous, although it may be necessary. Changing it continuously while it is being typed, and before the user expects it to be changed is a definite worry.

Congratulations, Brad. In addition to your one minute of fame you win a copy of Visual J++ from Microsoft.

Workshop is a slowly expanding and changing section. Thanks to your input through the online reader survey, Workshop is becoming bigger and better!

Tech Talk

150

Technobabble explains the mysteries and differences behind CISC and RISC architectures, while Step by Step gives some advice on how to install and configure Plug and Play peripherals.

Operating Systems

154

Windows 95 covers peer-to-peer networking, OS/2 takes a close look at the OS/2 archive feature and how to use it to your advantage, and Mac OS inspects the Mac OS 8 CD to ensure you're getting the most out of Mac OS 8. Linux takes a look at setting up the essentials.

Programming

162

Developers Corner takes a look at floating-point programming, JavaScript examines recursive functions, and HyperText explains the many uses of the META tag.

Shareware Summary

168

All files can be found on this month's **apcmag.cd**

Win! Win! Win!

To complement our Bug of the Month section in Developers Corner, Workshop is on the lookout for the most interesting, strange, funny or downright weird software bugs you can find. These include code snippets, examples of features that function poorly, or procedures for crashing a particular application. Anything and everything that is buggy deserves mention.

Send us the bug of your choice via email or snail mail, and you'll be in the running to win a copy of **NetObjects Fusion**. Feel free to send screen captures or example code listings, as well as details of how to duplicate the bug, if applicable.

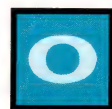
Winners will be announced in the February edition of APC, and the winning bug will appear in the Bug of the Month column. So start hunting!

For conditions of entry, see page 209.



Flipping through computer magazines will occasionally bring you across terms like RISC and CISC, acronyms used to describe processor architecture. The difference between the two terms is not always clear, so we will attempt to clarify them for you. By Nathan Taylor

Technobabble



One of the great schisms dividing the computing world is the argument over which is better, RISC or CISC — an argument about which is the best way to implement instruction execution. Instructions, as you probably know, are those commands sent to the processor that tell it to undertake a certain task, such as add two numbers or move a piece of data from one place in memory to another. An instruction unit is the part of the processor that actually carries out the instructions.

This might seem a rather petty thing to quibble over, but the fact is that the two different ways of building computers (architectures, as they are called) have a huge impact on the performance of the system, its ability to be backward compatible, and the ease with which development for the platform can take place.

The philosophies

The difference between a RISC and a CISC processor is not always cut and dried. There's no official dividing line between the two different classes of processor, and quite often the difference between a RISC and a CISC processor depends on what the marketing guys in big computer companies think would be the best way to promote their systems. (You could, I suppose, put together an argument for the use of microcode — which we'll cover a bit later — but it still wouldn't be clear.)

The philosophies behind the two types of processor are quite different even if their implementations are not. If you remember back to our Technobabble on programming (see APC May, page 176), we talked briefly about how different computers use different instructions. It is the philosophy surrounding the implementation of these instructions over which proponents of RISC and CISC machines bicker.

CISC stands for *complex instruction set computer*. Back in the days when programmers wrote in machine and assembly language (pure mathematical functions that directly correspond with computer instructions), there was a need to make life easier by developing processors which understood a richer set of instructions. When writing to a processor which had an 'add' instruction, for instance, but no 'multiply' instruction, the programmer would have to manually perform numerous adds to get the same effect as a multiply (of course, this is not a realistic example — even the earliest computers had multiply instructions — but it illustrates the point). By creating a special multiply instruction unit in the processor, life could be made much easier for the programmer.

Manufacturers of CISC processors also believed that having a large vocabulary of instructions made the processor faster, because fewer instructions were needed for a program to run, although the increased internal complexity of the processor made the execution of individual instructions slower.

Instructions in CISC processors are usually stored in microcode. Microcode is a layer of software between the instruction sent to the computer and the actual physical circuits of the computer. Essentially the microcode translates a complex instruction into a series of electronic routines that the physical circuits can understand. Instructions that directly correspond with actual circuits are called hardwired instructions, because the processor performs these operations natively, rather than needing microcode to translate it.

Going back to our add/multiply example, a possible solution would be to hardwire an add function, and to microcode the multiply function. To perform an add

operation, the numbers would simply be passed to the physical (hardwired) circuit. Meanwhile the microcode of the multiply function would run the data through the add gate as many times as it needed to achieve the desired result.

Microcode makes it easy to add new instructions — you keep your basic hardwired logic gates (add, subtract and divide, for instance) and add more complex instructions through microcode that makes use of those basic gates.

For a long time, CISC was simply the way everyone made processors (the term CISC didn't even appear until RISC computers appeared). Ten to 15 years ago, however, a new group of processor manufacturers came onto the scene, claiming that the CISC architecture was outdated, and that with the advent of third-generation languages and advanced software compilers, CISC was obsolete. The new compilers could now be used to construct advanced mathematical algorithms from simpler building blocks, thus making the more complex instructions unnecessary.

Proponents of RISC systems (*reduced instruction set computers*) believed that by removing some of the more complex instructions, basic instructions could be executed more quickly, because the processor doesn't have to deal with the overhead and extra bulk of all the complex instructions.

So essentially, this is where the two philosophies diverge: CISC vendors try to reduce the number of instructions required in a program (by increasing the number of instructions the computer can understand), but each has a longer execution time because the instructions are more complex. RISC vendors, on the other hand, try to reduce the time it takes to execute a single instruction, but require more instructions to perform a given task.

Both types of processor are in wide use today. The best examples of CISC processors are Motorola's 68k processors (used in older Macintoshes and Amigas), Digital Equipment's VAX processor, and the x86 processors (such as Intel's 486 and Pentium processors) used in most PCs today. RISC processors include the IBM/Motorola/Apple PowerPC processor, Sun's SPARC line of processors, Digital Equipment's Alpha, Intel's i960 (yes, Intel does make RISC processors) and MIPS processors.

It's important to note that in the past few years we have begun to see a major convergence in CISC and RISC architectures, so much so that the terms are beginning to become meaningless. Most newer CISC processors use RISC-like operations to accelerate the speed at which they perform certain tasks. Conversely, RISC vendors have included many commonly used CISC operations into their processors, so that now certain RISC processors have as many instructions as the CISC processors of a few years ago.

Superscalar processing is an excellent example of how the two parties have converged. A superscalar processor contains multiple execution units, allowing it to process more than one instruction at a time, effectively increasing the performance of the processor by a factor of two or more. Superscalar operations were first introduced in RISC computers, but soon found their way into x86 processors (start-

ing with the Pentium) and there they have stayed.

It's also important to realise that RISC and CISC are not the only architectures out there. Analog computers, neither RISC nor CISC, have been designed in the past, and in the future we should be seeing all-new architectures, such as neural nets.

One other processor philosophy deserves mention here, particularly given the fact that Intel's next-generation processor (codenamed Merced) will be using it, or something very similar: Very Long Instruction Word (VLIW) computers require clever compilers to do a lot of the work for them, which reduces the complexity of the processor and makes it faster to execute instructions.

Let's step back a bit. Most current processors make complex decisions regarding instruction scheduling while an application is running. The smarts are built into these processors to try to get the most efficient instruction execution ordering possible. The fact is, however, that the processor is doing guesswork, and this may not be the best way to optimise the running of a particular program.

To overcome this, VLIW computers let the software compiler do most of the work, rather than do it at the processor level. At compile time, the compiler will try to make decisions about the most efficient way of running the program. These decisions will actually be stored as part of the program code and sent to the processor

along with the actual instructions and data.

So while a normal processor would say 'do this, next do this, then this' and let the processor deal with trying to execute those instructions in the best order, the VLIW computer would say something like 'do this and this at the same time and while you're waiting for those tasks to be completed you can do this'.

To be a bit more technical, the VLIW computer uses something called instruction-level parallelism (ILP) to get the most out of the processor. The processor has multiple instruction units which can all operate at the same time. The instruction words will contain information on what to do with each of these instruction units (requiring a longer instruction), allowing parallel instruction execution in different parts of the processor.

Although this should, in theory, make the processor faster and simpler (and cheaper), the production of VLIW computers has been hindered by the lack of compilers capable of producing appropriate programs. Given that the algorithms for producing RISC or CISC machine code from third-generation languages are extremely complex, the algorithms required to compile to VLIW computers would be truly mind-boggling. When they are widely available, however, software developers will have a lot more power to develop highly optimised code for PCs. ■

Advantages

CISC:

- More efficient use of memory and storage (fewer instructions means lower storage requirements).
- Easy low-level programming (that is, machine/assembly language), allowing for highly optimised applications.
- Easier to write third-generation language compilers for CISC.
- Easy to make upwardly compatible processors. Each successive processor generation can easily support previous processor generations, with a superset of its instructions (amazingly, the Pentium II processor still has a bit of logic to execute applications for the 8086/8088 processor, the first microprocessor, built over 25 years ago).

RISC:

- Very fast instruction execution time.
- Simplified architecture, making for faster development times and (theoretically) lower cost.
- More room on chip for other features, such as extra fast memory or floating point units.

Disadvantages

- Complex and expensive to develop and produce.
- Slow instruction execution time, and different instructions require different amounts of time to execute.
- Tendency to have a lot of wasted instruction units — certain units might only be used about 10% or 20% of the time, failing to justify their existence.

- More instructions required to perform given task.
- Fast instruction execution requires very fast memory to deliver more instructions and data. Adds to expense of system.
- More difficult to program and compile to. Badly written programs tend to stall machine.
- Larger code size because of greater number of instructions required.

Plug and Play — what to do when it doesn't. **By Daniel Rutter**

Step by Step

You plug in a new scanner and now your mouse doesn't work. Your computer thinks it has eight serial ports. Windows thinks the network card is installed properly and working fine, yet it can't see any connected machines.

Welcome to Plug and Play.

On the face of it, Plug and Play promises to extract hardware setup from its awkward adolescent period, when cards were no longer configured with DIP switches and jumpers but instead used special set-up programs which, if lost, left you unable to change any settings. If you have a modem, you can often download a replacement set-up program — but if you have a card whose manufacturer has had three name changes in the past year, good luck.

The nice thing about DIP switches and jumpers is that you know for a fact what resources a card is set to use. The nasty thing is that changing these settings usually requires you to pull the card out of the computer.

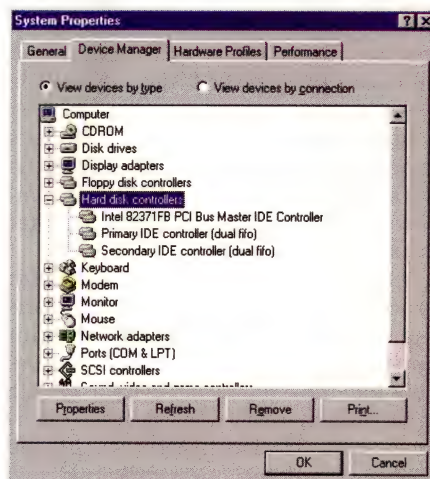
In Plug and Play, a standard computer-peripheral communication system allows the PC to see which of its resources are already in use, find out from new peripherals which resources they can use, and juggle settings to make everything work. No funny set-up programs are needed, and you never need to pull apart your computer to change a card's configuration.

There are two obstacles that must be overcome to achieve this aim.

Obstacle one

First, all computers and all devices plugged into them are not yet Plug-and-Play-compatible. If your computer has a Plug and Play BIOS, and that BIOS is bug-free, and all your peripherals are Plug and Play, and you have bug-free, up-to-date drivers for them, you probably won't have any problems. But if you score a miss in any of these departments, you can be in for an experience as annoying as setting up a plain, old non-Plug-and-Play computer.

Any machine made since late 1995 is



likely to have a Plug and Play BIOS, but older BIOS versions can have strange quirks. Updating your BIOS is one of those procedures that differs for every machine; some need a whole new chip, others use a Flash ROM and can be updated with a special utility and a patch file. Flash BIOS updates are less fuss, but an error during the BIOS write procedure can leave you with a stone dead computer.

Driver choice is also important. A driver for a given device may come with Windows, but a more up-to-date and specific driver is likely to be included with the hardware, and it's wise to use that — or to check with the manufacturer to see if an even better driver has become available. If your hardware works fine, and the latest driver has no extra features that matter to you, you can take it or leave it. But the improvements are often worth the minimal investment needed to get the latest software.

Obstacle two

The second obstacle is that, with or without Plug and Play, IBM-compatible computers have some serious expansion restrictions. There are only so many Interrupt Requests (IRQs), Direct Memory Access (DMA) channels and input/output (I/O) addresses, and it's quite possible to have a combination of hardware that may all fit in the box, but can't all work at once.

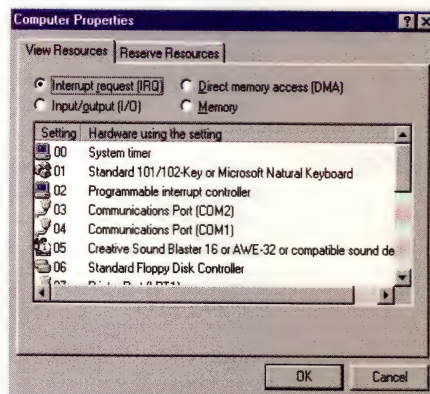
When sorting out these sorts of problems — and especially when troubleshooting device conflicts — it helps to understand exactly what the three kinds of resources are and what they do.

IRQs

When a card needs the attention of the CPU, it uses the IRQ 'level' assigned to it to signal this fact. Two devices can share the same IRQ, as long as they never both try to signal the CPU at the same time. In practice, not many devices will coexist like this, and IRQ clashes generally stop all clashing devices from working.

There are 15 IRQs, and most of them are reserved for basic system components, usually leaving IRQ2, IRQ5, IRQ10, IRQ11 and IRQ12 free. In the extensions-and-additions tradition of IBM-compatible computers, there are really two interrupt controllers, one for IRQs 0 through to 7 and the other for 8 through to 15. IRQ2 is the magic conduit between the two controllers, and hence behaves oddly; IRQ9 is 'software redirected' to IRQ2, which means a device that's set to use IRQ2 can have its driver set to IRQ9. Since the Plug and Play BIOS in most modern machines occupies IRQ9, users no longer have to worry about this confusing situation.

To free a few more precious resources, try disabling serial or parallel ports from your CMOS setup (press Delete right after rebooting). A machine with two parallel ports will use IRQ5 for the second one, but if you don't need a parallel port, disable LPT1 and IRQ7 will be free. IRQs 3 and 4



can be freed by disabling COM2 or COM1 respectively (COM3 and COM4 use the same IRQs, but not the same I/O addresses, as COM1 and COM2, so you can have a machine with four serial ports set up as long as you never use ports 1 and 3 or 2 and 4 at once). If you just remove a parallel or serial port in Device Manager, Windows will helpfully autodetect it and replace it again when you reboot, so you have to use the CMOS setup.

I/O addresses

I/O addresses, also referred to as 'I/O ports' or 'port addresses' are what a CPU uses to tell which of its peripherals is presently clamouring for its attention. I/O address numbers are always expressed in base 16 (hexadecimal), which explains those letters from A to F in the addresses. Fortunately, there's no need to perform hex-to-decimal calculations when dealing with I/O addresses.

Modern PCs have 65,536 I/O addresses (numbered 0000 to FFFF), but devices on the ISA bus (old-style cards, as opposed to PCI, MCA, EISA and VESA devices) can only use the first 1,024 of these addresses (000 to 3FF). The expanded address space can cause problems in some computers whose ISA buses are sent commands which also go to one of the more recent buses. The ISA bus cannot tell the difference between, say, address 10F0 and address 0F0, and so these addresses clash in such machines. Keep this last-three-digits problem in mind if you see a mystifying problem in a machine which definitely shouldn't have any clashing settings that clash.

Devices generally each use a block of eight or 16 I/O addresses, which allows several pieces of information to be sent and received at the same time, and generally also wastes a few addresses. This means there's room for more than 64 devices even in the relatively cramped ISA I/O address space.

Eighteen blocks of addresses are likely to be used as a matter of course by the basic hardware — the keyboard, the serial and parallel ports, the hard disk controller, and so on — but this still leaves a ton of spare addresses. Unfortunately, most peripherals are capable of using only a few selected blocks of I/O addresses, and if you can't juggle around the I/O possibilities of all your hardware so that everything gets its own address, you're out of luck. If two devices are set to use the same I/O addresses, it's likely that neither will work.

DMA channels

Direct Memory Access (DMA) allows expansion cards to directly access system memory, without having to send data via the CPU. Only one device can use DMA at a time, and there are eight 'channels' devices can use. DMA2 is always used by the floppy drive controller, and DMA4 is eaten by the 'link' from the second DMA controller to the first (XT-class computers had a single four-channel DMA controller), but the rest are available for use.

Troubleshooting

Whenever a new piece of hardware doesn't work, check to see if everything else in your computer still works. Chances are, the new gear's clashing with the old gear, and you will have lost your CD-ROM drive, your mouse, your network card, your MIDI playback or something similar. If you know what the new hardware clashes with, you know what resources it's trying to use, and you don't have to trust Windows to tell you what's going on.

Also check Device Manager (in System Properties, accessible from the Control Panel or by right-clicking My Computer and selecting Properties) to see if Windows has helpfully autodetected things that aren't really there. 'Unknown Device' listings are a dead giveaway, as are duplicate listings for ports. Delete these things without changing anything else and they'll all just come back the next time you reboot, but they are helpful indicators of what might really be going on.

The standard Windows 95 online help covers Device Manager in detail, so it needn't detain us here. The only thing to remember when using Device Manager is not to trust it. Windows can't do everything. If Windows says there are no conflicts, but a device or two still aren't working, there's a good chance that a conflict is the cause.

The standard online help also contains the Hardware Conflict Troubleshooter, which will step you through many hardware problems. It has been said that the Windows Troubleshooters are simply a way of spending a restful five minutes before you actually start trying to fix a problem, but this one will keep beginners on track.

Armed with the above knowledge you should be able to manually edit a device's properties in Windows, or set them up via a DOS configuration program, and solve any clashes that might appear. ■

Resources at a glance

Colour key:

Red — definitely used in modern PCs

Blue — possibly used in modern PCs

Green — extremely unlikely to be used in modern PCs

IRQs:

IRQ0	Timer output
IRQ1	Keyboard controller
IRQ2	Route to Interrupt controller 2
IRQ3	COM2, COM4
IRQ4	COM1, COM3
IRQ5	LPT2
IRQ6	Floppy disk controller
IRQ7	LPT1
IRQ8	Real-time clock
IRQ9	Plug and Play BIOS
IRQ10	Free
IRQ11	Free
IRQ12	PS/2 mouse, if installed
IRQ13	Maths coprocessor
IRQ14	Primary hard disk controller
IRQ15	Secondary hard disk controller

DMA channels:

0	Dynamic memory refresh
1	Free
2	Floppy disk controller
3	Free
4	First DMA controller
5	Free
6	Free
7	Free

I/O addresses:

000-01F	DMA controller 1
020-03F	Interrupt controller 1
040-05F	Timer
060-06F	Keyboard
070-07F	NMI (Non-Maskable Interrupt) and CMOS RAM
080-09F	DMA page register
0A0-0BF	Interrupt controller 2
0C0-0DF	DMA controller 2
0F0-0FF	Maths coprocessor
1F0-1F8	Hard disk
200-20F	Joystick controller
278-27F	Parallel port LPT2
2E8-2EF	Serial port COM4
2F8-2FF	Serial port COM2
378-37F	Parallel port LPT1
3B0-3BF	MDA (monochrome display adapter)
3BC-3BE	Parallel printer on MDA
3C0-3CF	EGA (enhanced graphics adapter)
3D0-3DF	CGA (colour/graphics adapter)
3E8-3EF	Serial port COM3
3F0-3F7	Floppy disk controller
3F8-3FF	Serial port COM1

Interested in networking your home PCs? Windows 95 makes it a relatively painless affair. By Gareth Jones

Windows 95

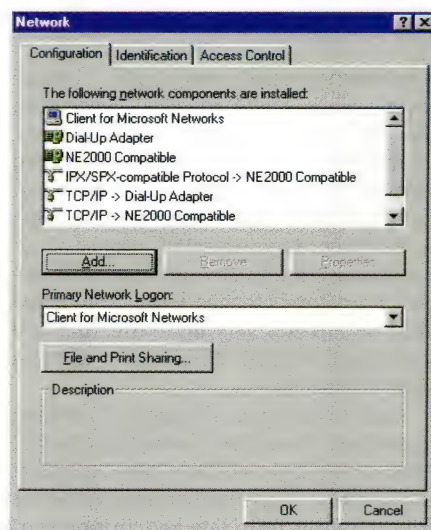
More and more people live in homes with multiple computers these days. Whether it's a common interest shared between flatmates or family members or part of a SOHO setup, sharing information between computers is not only helpful, it's often necessary. Add to this how much more fun games can become when you're playing them with friends on a local network, and it should become evident just how useful a LAN can be. This month it's time to explore Windows 95 networking, from what you need through to how to go about setting it up.

Understanding protocols

Most workplaces have a network of computers, managed by the office network administrator (a person right up there with the general manager in the 'most feared, most respected, and least seen' category). Large office networks are complex entities, requiring the services of qualified professionals, but for small Windows 95 LANs it's a comparatively simple process.

The protocols used all work in much the same way, breaking down information sent between machines into 'packets'. The first, TCP/IP (Transmission Control Protocol/Internet Protocol), is a combination of two separate protocols. TCP breaks data down into discrete 'packets' or 'datagrams', then passes them on to the IP protocol which is responsible for getting them to the required address. Each datagram has a 'header' inserted by TCP, which includes information such as the port number (so that the data doesn't get mixed up with other files) and a sequence number (to keep the datagrams in order), which is used at the other end of the connection so that the data can be reassembled.

Developed by Novell, IPX/SPX is the other important protocol for a small LAN, and again it's a combination of two protocols working in tandem. IPX stands for



Internetwork Packet eXchange, and SPX for Sequenced Packet eXchange. IPX handles how the data to be sent is to be broken down into datagrams in much the same way that TCP does, and SPX deals with the sequencing of the datagrams to be sent and received, as the name suggests. There are many other arcane terms with equally arcane descriptions in the realm of networking, but for a home LAN, the above are the two important ones. To set up your LAN just follow the directions below.

What you will need

First things first — you can't make use of a network without a network adapter card. Here's where it might get a little bit confusing because there are plenty of different types of network cards, and a few different ways to use them.

Firstly, you will need to decide whether to go for a PCI or ISA card. For a home LAN the performance difference between these cards is negligible. The deciding factor may be the type of slot you actually have free in your machine. With many computers only having four or five PCI

slots, and a plethora of components that make use of the PCI bus, you may find that you don't have a PCI slot to spare, or you want to keep one free for future components. In this case an ISA network card will come in very handy. You should be able to pick up a decent network card, with cables and terminators, for well under \$100.

Cables come in two flavours. The cheapest and easiest is a coaxial cable, which makes use of T-junctions and terminators. T-junctions allow for multiple computers to be daisy-chained together, and terminators 'terminate' the chain at either end. The other option with regard to cabling is what's known as twisted pair. This looks somewhat like a phone connection and in order to use it all machines must be hooked up to the 'hub'. A hub is basically an external device which all the network cable plugs into. For larger networks of over 10 computers, this is often the easiest solution because each computer is only connected into the hub rather than daisy-chained with other machines. It will cost a little more for a network of this nature, however, and if you're only going to have a few PCs on the network, there's really no need for it.

Installing the network adapter

Depending on what type of network card you're using, and which version of Windows 95 you're running, there will be differences in the way that the network card is installed. For most, especially newer PCI cards, this is a simple process. Once the card is plugged into your computer, Windows will detect the new hardware and prompt you for a driver provided by the manufacturer. Other than changing the IRQs if there is a conflict with other devices, that's it.

For ISA bus cards you may need to run a set-up program from the DOS prompt to set the IRQ on the EPROM (Eraseable

Programmable Read Only Memory) which the card uses to store its settings. There are too many variations in the procedure to explain this in any detail, but following the manufacturer's instructions should see you right. Once this step is completed, open up the Control Panel and select 'Add new hardware' (if it isn't detected by Windows) and find your card from the list. If it's not listed, most cards are NE2000 compatible and you can just select Novell/Anthem NE2000. After Windows finishes copying, open up your Control Panel, then System, and double-click on your network card. Edit the properties and set the IRQ to match the setting you made using the DOS set-up program. After a reboot, all that remains is to tell Windows which network protocols you want to use.

The network settings

From the Control Panel double-click on Network, and then select Add. The first thing you should install is the 'Client for Microsoft Networks', which is found by selecting Client and then scrolling down to Microsoft. Once this is completed you should change the Primary Network Logon to 'Client for Microsoft Networks', unless it has changed automatically.

noting that although IPX/SPX and TCP/IP are listed under Microsoft, it can't actually lay claim to these protocols. IPX was developed by Novell while TCP/IP was first drafted by Vint Cerf and Bob Kahn in the early 1970s). Lastly, select Add once again, and then select Service and choose 'File and Printer sharing for Microsoft Networks'. This will automatically add the 'Client for Microsoft Networks' and allow you to access drives on other machines. All you need to do now is give your machine a name and a Workgroup. Just click the Identification tab and type in a unique name. For the Workgroup, make sure you use the same name on all PCs.

Tweaking, sharing, viewing, playing

Right, that's the bulk of the setup done. You'll notice that when you reboot you'll be prompted for a network logon. Unless you already have different user profiles set up, or want to keep your files safe from prying eyes, a blank password is fine. Just hit Enter when prompted for the password, and then enter again for confirmation. If you don't want to see this prompt each time you boot up you'll find a nifty utility

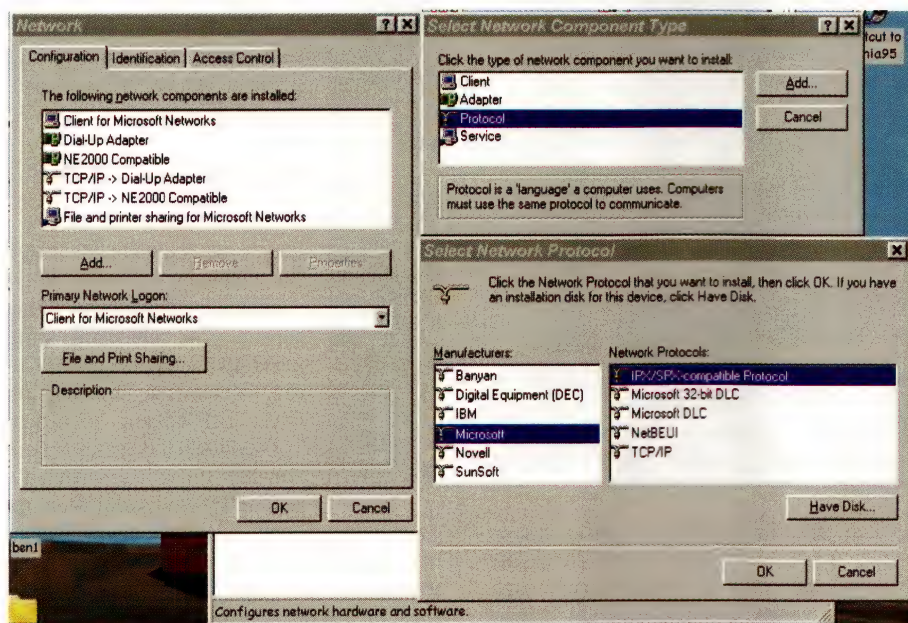
open up My Computer, then right-click on the drive you wish to share. Select Sharing, and then set the options (share name, access control, and so on) as you see fit. Once this is done, you should be able to see other computers on the network by opening Network Neighbourhood and browsing through the entire network. This doesn't work every time... If at first you can't see other computers on the network, try going to Find, Computer from the Start menu, and type in the name of the computer you are searching for. Give it a couple of tries, because sometimes Windows is a tad temperamental. If all else fails, then it's best to check over the connections between the computers. Make sure both ends are terminated (if you're using coaxial) and that the cable is fitted to the T-junction or hub nice and snugly.

What next?

Now you've conquered the demon of networking under Windows 95, you can play network multiplayer games, and you can share files and printers with other computers — but why can't you send messages to other computers on the network? It seems silly that Microsoft hasn't seen fit to implement a decent chat or message system for a small LAN, but there are a couple of options available to you.

The first is called WINPOPUP.EXE and you'll find it in your \Windows directory. It's only a bare-bones message system, but it should suffice for sending quick notes. If you feel like a chat, you'll find a half-decent program in WINCHAT.EXE on your Windows 95 CD. To install, open Control Panel, Add/Remove Programs, Windows Setup, Have Disk, then insert your Windows 95 CD and scroll down to Other. From there, select the Chat directory, and then WINCHAT.INF. Click OK a couple of times, then tick the Chat box and click on Install. You won't be able to run the program straight away; first you'll need to double-click on NETDDE.EXE in your \Windows directory. Once this is done, you'll find Winchat in the start menu under Programs, Accessories, Chat. If it's the kind of thing you'll be using on a regular basis, then it's probably a good idea to put a shortcut for NETDDE.EXE into your Startup folder. Finally, you've done it all! Congratulations.

You probably need something fun to take your mind off all the hard work you've just done, and there's nothing wrong with that. Multiplayer networked Quake comes highly recommended.■



Next click on Add once again, and this time select Protocol. You need to add IPX/SPX, found under the Microsoft label (see Figure 1). If you want to use TCP/IP over your network as well (very handy for some multiplayer Internet games), you can also install this by clicking 'add' and scrolling down to Microsoft (it's worth

on this month's **apcmag.cd** called Tweak UI that automatically logs you on each time Windows is started (see the Network tab once its installed).

There isn't much point setting up a network if you aren't going to share the contents of your drives — apart from playing network games, that is. To do so,

How to make the most of OS/2's built-in archive feature. **By Ashton Mills**

OS/2 Warp



S/2's archiving facility is a rather handy tool. It can single-handedly save you from strange crashes, video problems, boot problems and even from yourself. When things go wrong, Alt-F1 is the magic keystroke you need to remember. Learn it well, for all OS/2 users find themselves at this screen at one time or another.

Automatic archiving

The main purpose of OS/2's archiving feature is to back up key files which, in the event of corruption, can be replaced by a single keystroke.

Take note that 'key' files refers only to those OS/2 needs to boot up. None of your data or other parts of the OS/2 directory tree are backed up.

The archive feature does two things. It backs up your desktop directory hierarchy (objects on the desktop correspond to a disk-based directory hierarchy); and copies the following files: OS2.INI, OS2SYS.INI, CONFIG.SYS, AUTOEXEC.BAT and STARTUP.CMD.

When you restore a backup, these files are copied to your \OS2\ and root directories and the system boots. Because the OS2.INI and OS2SYS.INI files are backed up along with your desktop hierarchy, your tailored desktop is, obviously, also backed up. The archiving feature is not only handy to restore from crashes or other forms of accidental data loss, but also just as a mechanism to save and restore your desktop — especially useful if you've installed software that is hard to remove or has permanently altered your system.

Like any archiving mechanism, it's important to keep the archives updated regularly. You can create an archive simply by right-clicking anywhere on your desktop and selecting Properties. Click the Archive tab and you'll see an option called 'Create archive'. Select it and reboot.

Take note that OS/2 will now create an archive *every time* you boot, which for most of us isn't what we want. OS/2 will only archive four backups at a time, and older ones will be pushed out by newer ones. So,

to ensure you make a backup just once, remember to deselect the archive box after your machine has rebooted.

However, archiving with each boot can be handy if you're installing new software and you'd like a recovery option at each step of the installation procedure.

The recovery screen

To enter the recovery screen, simply press Alt-F1 when you see the little OS/2 box appear in the top left-hand corner during boot time.

You'll notice that the recovery screen also has a number of other options pertaining to general system maintenance. From this screen you can quickly drop to an OS/2 prompt (if your machine refuses

archive. This was made when you first installed OS/2 and recovering this archive will return your system to its base configuration. Hopefully, you'll never need to use this because all forms of tailoring and system configuration will be lost when this archive is restored.

Now, what if you want to back up other essential files such as the SYSTEM.INI from Win-OS/2 or your LAN configuration files? As it happens, the key files that OS/2 backs up are all listed in the file OS2.KEY in your \OS2\ARCHIVES\ directory.

The format of the file is very simple — KEYFILE:[path and filename]. If you want extra files to be archived, just add them to the list you find in OS2.KEY. Don't remove any of the files currently listed — you need them. There is, however, no limit to the

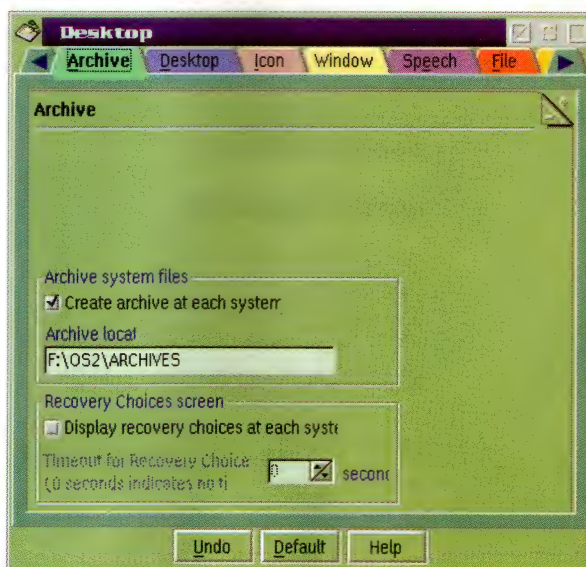
number of files you can add. But remember they take up space, so be sure to archive only those files that are essential and don't rely on any data structures that, after a recovery, may no longer be present.

Making use of the technology

Like most aspects of OS/2, the recovery screen is completely configurable. The screen you see when you press Alt-F1 is a simple ASCII file, or rather a collection of files, all found in your \OS2\BOOT\ directory. You can edit these files with any text editor and tailor them to

your liking. Don't worry about what keys are listed for each option; these files merely present the user with a list of choices, but don't handle what to do when a key is pressed. In fact, it's possible to create an option that *isn't* listed, so only you, the owner of the machine, can invoke the function.

The three files relating to the recovery screen are ALT-F1.TOP.SCR, ALT-F1.MID.SCR and ALT-F1.BOT.SCR. The first lists your standard recovery options, the second lists your archive backups, and the



to boot, you'll need this to gain access to your drive so you can edit the CONFIG.SYS, and hopefully reverse any damage), revert to standard VGA drivers (some video drivers require you return to default VGA before installing them) and even set hardware detection — for this boot only — on or off.

You will see any archives you have made on the bottom half of the screen. The most recent is listed first and, at the bottom, you will see an archive backup that is never pushed off the list — the INSTALL



Tip of the Month

If you're one to load many programs from your Startup folder, you may have come across a slight problem with system hangs. Sometimes when many programs are initialising along with the rest of your desktop, the WarpCenter can cause problems and freeze the machine.

The solution is to remove WARPENTER from the AUTOSTART= line in your CONFIG.SYS and instead drag and drop a shadow of the WarpCenter icon (found in your OS/2 System folder) into your Startup folder.

This causes the WarpCenter to load after the other programs in your Startup folder, instead of initialising from your CONFIG.SYS and clashing with programs that are loading from the Startup folder at the same time.

last file is, essentially, empty apart from a carriage return. These files are also read-only, and there's a reason for this — to stop accidental tampering.

All three files are displayed in order down your screen, and each is merely that — a display. The moment you press any key, the standard REXX batch file ALTF1.CMD is called to parse the key and carry out the appropriate action. Actually, this is true only of recovery and archive options. If the key you pressed isn't processed by ALTF1.CMD, OS/2 will next attempt to call a CMD file in the format of ALTF1?.CMD, where ? is the key you pressed. Failing that, OS/2 will assume the key you pressed corresponds to a CONFIG.SYS file in the format CONFIG.?, where again ? corresponds to the key.

So what's all this about? Functionality. It's not uncommon for an OS/2 user to find themselves in need of multiple CONFIG.SYS files (for example, a LAN and non-LAN boot), or in need of carrying out a number of tasks before OS/2 boots (backing up certain files, reconfiguring set-up files, and so on).

Taking advantage of this functionality depends on what you want to do. More often than not, the common use for this technology is to implement multiple CONFIG.SYS files, and this can be done in one of two ways.

ALTF1?.CMD

As stated above, if the key you press isn't

present in ALTF1.CMD, OS/2 will next attempt to execute a CMD file matching the key in the format ALTF1?.CMD. For example, if L were pressed, OS/2 would attempt to execute ALTF1L.CMD.

This CMD file is like any other REXX file — you can issue any number of commands and do absolutely anything you wish. Very handy for pre-boot file cleaning, backing up or system tailoring. For now we'll just assume you want to switch between a LAN and non-LAN CONFIG.SYS file (if you want to improve system performance by saving memory when not connected to a LAN).

First copy your original CONFIG.SYS to a backup in your \OS2\BOOT\ directory, for example:

```
COPY \CONFIG.SYS \OS2\BOOT\ CONFIG.LAN
```

If your current CONFIG.SYS has your LAN drivers in, edit it now and remove them. At this stage you now have one CONFIG.SYS without drivers in the root of your drive and one with LAN drivers in \OS2\BOOT\.

Next, create a file called ALTF1L.CMD in your \OS2\BOOT\ directory and in it place:

```
COPY \CONFIG.SYS \OS2\BOOT\CONFIG.TMP
COPY \OS2\BOOT\CONFIG.LAN \CONFIG.SYS
COPY \OS2\BOOT\CONFIG.TMP
\OS2\BOOT\CONFIG.LAN
```

Since it is a standard REXX file, you can perform any other file operations you wish in this file. For now these three lines effectively swap your two CONFIG.SYS files. When you press L in the recovery screen, OS/2 will carry out the contents of ALTF1L.CMD before continuing to boot OS/2. As such, each time you press L in the recovery screen you can swap your CONFIG.SYS files around, and then boot.

If all you want to do is swap between a number of tailored CONFIG.SYS files, there is an easier way.

CONFIG.?

If OS/2 can't find an ALTF1 file matching your key it will do something much simpler — look for a CONFIG.? file matching the key you pressed and boot using that as CONFIG.SYS.

This means all you have to do is copy your current CONFIG.SYS to \OS2\BOOT\ as, for example, CONFIG.L and then tailor it to your liking. No other files need to be created.

The difference in operation between

this and an ALTF1 file is that with the latter, the operations you carry out in the REXX script are permanent. In our above ALTF1L.CMD file, for example, the two CONFIG.SYS files will be switched and will stay that way until the script is run again.

If we were using just our example CONFIG.L file, when you press L in the recovery screen, OS/2 will boot using CONFIG.L instead of the normal CONFIG.SYS and will do so only for the current boot. Next time you boot up, if you don't go through the recovery screen, OS/2 will boot using its normal CONFIG.SYS.

This is an extremely useful feature if you have a basic CONFIG.SYS to ensure you can always boot, or a specialised CONFIG.SYS for maintenance purposes or, as in the example above, a CONFIG.SYS for LAN connectivity that you rarely use (and so only invoke through the recovery screen when required).

The SCR files

Once you've decided what you want to do, you can add your options and keys to the recovery screen choices by editing ALTF1BOT.SCR. You can edit ALTF1TOP.SCR or ALTF1MID.SCR, but this isn't a good idea as these two files list standard recovery options and your currently listed archive backups. ALTF1BOT.SCR is empty and there for your use.

To add an entry, simply edit the file, add a couple of spaces to create an indent, and then type whatever you wish. For example:

L) Standard CONFIG.SYS with LAN connectivity

Q) Quick boot. No sound, TCP/IP or network support

And so on. For each option you could create ALTF1 files or just CONFIG.? files. It all depends on what you want to do.

Take note that due to the standard recovery and archive options, various keys are pre-allocated and shouldn't be used to represent your own choices or ALTF1 and CONFIG.? files. These are: O, X, x, C, c, M, m, V and v.

While most users won't find much need to create tailored ALTF1 files, switching CONFIG.SYS files using OS/2's archive and recovery screen features is an easy way to save RAM on memory-constrained systems.■

After installing Mac OS 8, take a closer look at the CD for some helpful additions. **By Stephen Withers**

Mac OS



Whether you did a full or custom install of Mac OS 8, you should have another look at the CD-ROM — you may find some useful extras. Furthermore, there are some new items from Apple and other sources to augment the system software.

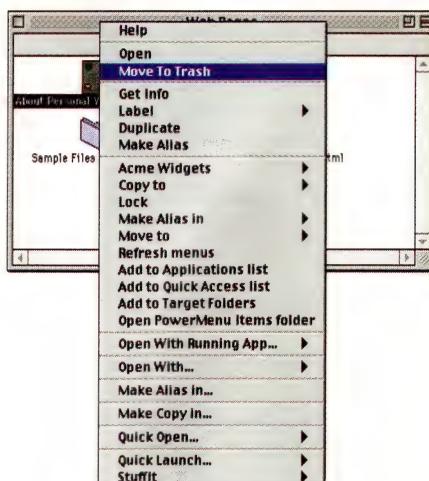
The CD Extras folder on the OS 8 disc is a good place to start. For those still looking for just the right desktop picture or an old favourite desktop pattern from System 7, there are a total of 22 pictures and a scrapbook of over 60 patterns. If you hanker for more artistic pictures, try the Aurora Collection — “inspired by the Hubble Space photographs; not illustrations of outer space, but images meant to express the mystery and beauty of the natural world” — at <http://www.concentric.net/~Ira97/dskpct/dskpct.shtml> (\$US10 shareware).

Additional Modem Scripts contains a small collection of scripts for recent V.34 and faster modems from Global Village, Hayes, Supra, Practical Peripherals and US Robotics. The Apple Telecom folder is only relevant to those with PowerPC-based Macs with Apple Express Modems, Geoport adapters or certain PC Card modems. It contains Mac OS 8-compatible versions of Apple's fax and telephony software.

AppleCD Player is an alternative to the AppleCD Audio Player placed in Apple Menu Items by a normal install. As well as playing audio CDs, it displays the additional content of CD Extra discs and plays QuAC (QuickTime Album Container) files, which may be associated with an audio CD or completely standalone. Some multi-megabyte samples are available at <http://www.foothold.com/~premise/samples.html>. AppleCD Player is substantially larger than AppleCD Audio Player, so don't bother installing it unless you can make use of it.

Talking of entertainment, Eric's Solitaire Sampler provides a pair of single-player card games. A nice implementation, but depending on the age and model of your Mac, you may already have it.

Updates for At Ease and HyperCard provide Mac OS 8 compatibility. Similarly, Iomega Tools provides the 5.0.3 driver and



related software for Zip and Jaz drives. If you own one of those drives and haven't updated the software recently, here's your chance.

MoviePlayer Extras aren't much use unless you're interested in creating your own QuickTime movies or manipulating existing movies, but nested inside this folder are some music, animation and photo files that might give you a better idea of QuickTime's capabilities. You'll also find a music video in the QuickTime Sample folder.

Pointer Mode Control is for 7200 users only. If you are bothered by the absence of the mouse pointer from your screen captures, the Pointer Mode control panel corrects this quirk. The downside is that it can cause the pointer to flicker while over graphics.

There's not much of interest in QuickDraw 3D Extras apart from the famous Gerbils! demo and some 3D models which we've seen in earlier QD3D releases. The demo version of the Cumulus image database is severely restricted, so don't waste time on it unless you're prepared to buy the full product.

Most of us will start up from the Mac OS 8 CD-ROM when we need to

repair our hard disks with Disk First Aid, but third-party CD drives don't have that capability. Create a Disk Tools floppy from the image files on the CD-ROM: Disk Tools 1 is for 68040-based systems while Disk Tools 2 is for Power Macs and clones.

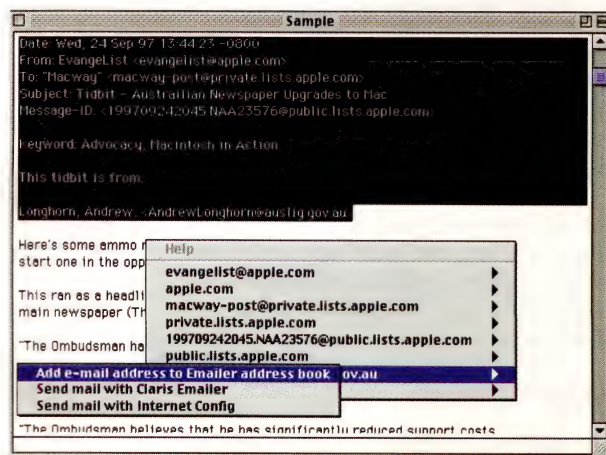
Optioning up

When you installed Mac OS 8, you probably didn't select all of the components. The optional items are Mac OS Runtime for Java, Personal Web Sharing, QuickDraw 3D, OpenDoc, MacLink Plus, Apple Location Manager, Cyberdog, QuickDraw GX, Text to Speech and Remote Access. Location Manager is useful on a PowerBook, MacLink Plus is invaluable when exchanging documents with users of other software, and Personal Web Sharing is good for small intranet applications. Otherwise, if you're not sure whether you should install them, don't bother — just remember they are on the CD if you ever need them.

If you decide to install any of these items, you can either run the Mac OS 8 installer again, or the individual installers found in the Software Installers folder. The former method saves time when you want an Easy Install of multiple components.

Net stuff

Released after Mac OS 8, Internet Address Detectors (IAD) is the first application of a



rather smart technology called Apple Data Detectors (ADD) that the company demonstrated over a year ago. The basic idea is to analyse a portion of text for data of particular types, then provide a choice of actions relevant to that data. ADD is implemented through the Contextual Menu, so you simply select the text of interest and Control-click.

With IAD, email addresses, Web and FTP URLs, telnet hosts and newsgroups can be opened, bookmarked or read. The most common applications (Emailer, MSIE, Netscape, NCSA Telnet, Fetch and Newswatcher) are directly supported, but others are accessible via Internet Config.

An early problem identified with IAD involves programs such as Photoshop which already use Control-click to bring up their own menus. When no text is selected, the Finder's Contextual Menu appears in place of the application's menu. Who's to blame doesn't really matter as long as a fix is provided promptly.

A temporary workaround is IADD, a hack that disables IAD when selected applications are running, allowing them to receive Control-clicks. Given the developer's comment that "This took about three hours to make and has been tested for about 15 minutes. It seems to work," I'll wait for something more official; but if you're feeling brave you can find IADD on apcmag.cd.

IAD itself can be downloaded from [ftp://ftp.apple.com.au/pub/Apple_Software_Updates/Macintosh/System/Other_System/IAD_1.0.1.img.hqx](http://ftp.apple.com.au/pub/Apple_Software_Updates/Macintosh/System/Other_System/IAD_1.0.1.img.hqx).

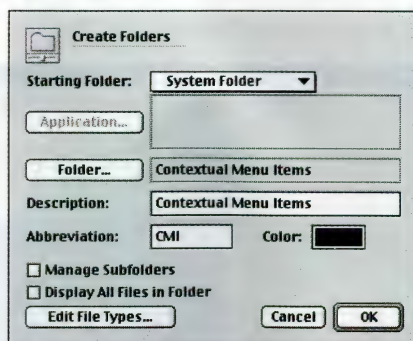
More ADDs are expected during 1998. Because developers can provide support for additional data types and applications, we won't rely solely on Apple. A Data Detector that could recognise a name and address, then insert it into a letter template or create a new entry in a contacts list (or update an old one) would be one of my first choices.

A swag of Contextual Menu extensions have been released by third-party developers. There is some overlap in functionality, so take the trouble to examine a selection of them and find the combination that best suits your needs. Installing everything in sight isn't such a good idea, as it can cause the Finder to run out of memory. Remember that some startup managers (notably Conflict Catcher) let you specify new folders to be managed, so adding Contextual Menu Items to the list makes reconfiguration easier.

Acme CMM Widgets (<http://www.acmetech.com/cmm.html>, freeware) is especially useful for Web designers, as it creates tags corresponding to the

selected GIF or JPEG files and lets you 'pick up' colours from the desktop as HTML tags (or RGB values). Other functions include generating the full path to a file (very handy when you're scripting) and transferring text from the Clipboard to a clipping file. Acme Technologies deserves recognition for putting all these functions into a single hierarchical menu which keeps the Contextual Menu to a manageable size. Other developers should follow suit, but what I really want is to be able to rearrange the menu to suit my own pattern of use.

CMTools (<http://plaza.v-wave.com/aaaj/CMTools3.0.sit.hqx>, freeware) acts as a launcher, creates aliases in specified folders, compresses and decompresses items



(using your existing compression software), copies and moves files and folders, changes the creator and type codes of files (by example, not to arbitrary settings — I've been missing the ability of Aladdin's Magic Menu to do this since I installed Mac OS 8.0), locks or unlocks files, and duplicates the Application Menu.

Look Mom, No Hands! (<http://www.toolsandtoys.com/>, \$9 shareware) is a system extension that pops up the menu when you hold down the mouse button rather than the somewhat awkward Control-click. It sounds great, but unfortunately it's incompatible with IAD and made my system very sluggish. I'll wait until it's been refined. If you write software, check out SmartClicks from the same source: it claims to add Contextual Menus support with just two lines of code.

Power Menu (<http://www.ee.mcgill.ca/~marka/power-menu-201.hqx>, \$15 shareware) has been mentioned here before, but a minor update appeared while I was preparing this column.

StuffItCMMPlugin (<http://venweb.com/controlclick/StuffItCMMPlugin0.1b7r2.sit>, apparently freeware) lets you Stuff or UnStuff, BinHex encode or decode, and toggle the self-extracting setting of an archive from the Contextual Menu. It was still a

prerelease at the time I tried it, but seemed to work properly.

The Control Click home page (<http://venweb.com/controlclick/>) was very new when I found it, but if its creator keeps up his enthusiasm this will be a valuable information source for Contextual Menu fans.

Post 8.0

Moving back to Apple's own software, QuickDraw 3D 1.5.3 was released a month or so after Mac OS 8.0. The changes are minor ("miscellaneous bug fixes and optimizations"), but QD3D users can get the update from [ftp://ftp.apple.com.au/pub/Apple_Software_Updates/Macintosh/System/QuickDraw_3D/](http://ftp.apple.com.au/pub/Apple_Software_Updates/Macintosh/System/QuickDraw_3D/). The Windows version is at [ftp://ftp.apple.com.au/pub/Apple_Software_Updates/DOS-Windows/QuickDraw_3D/QD3D153.ZIP](http://ftp.apple.com.au/pub/Apple_Software_Updates/DOS-Windows/QuickDraw_3D/QD3D153.ZIP).

Due around the time you will be reading this is Mac OS 8.0.1. Apple Australia officials have stated that HFS+ will be a feature, and — contrary to previous reports — this first release of the new file system will support very large volumes and files (up to 263 bytes), variable allocation block sizes (reducing and possibly eliminating the main reason for partitioning disks) and long (256-character) filenames using the Unicode character set.

Several other components should prove useful to various groups of Mac OS users. PC Exchange 2.2 supports long filenames; VFAT and FAT32; and Zip, Jaz and SyQuest drives. Mac Runtime for Java 2.0 apparently provides a worthwhile performance improvement over its predecessor and will incorporate JDirect and whichever minor release of Sun's Java Development Kit 1.1 is available at the time MRJ 2.0 is frozen. The significance of JDK 1.1 is that it supports JavaBeans, the architecture for Java components. MRJ 2.0 will also include a just-in-time compiler for 68k systems, AWT (Abstract Windowing Toolkit) enhancements and some Mac-specific improvements.

Open Transport 1.3 will support multi-homing on one hardware address, while LaserWriter 8.5.1 (already released with Apple's latest printer) allows the destination printer to be specified by its IP address.

8.0.1 also provides DVD support and "numerous bug fixes". I hope the contents of Finder windows will be displayed more snappily: increasing the disk cache size to a couple of megabytes and turning off folder protection helps, but this sluggishness is still my main gripe about Mac OS 8.■

Getting the essentials up and running.

By Geoffrey Bennett

Linux

Configuring X

The X Window System is the graphical user interface for Linux and other Unix systems. With a few exceptions, every program that uses graphics will run under it. If X was configured when you installed Linux, you can start it by typing 'startx'.

Configuring X used to be a challenge, but it is now relatively straightforward with the help of tools such as Xconfigurator, XF86Setup, and xf86config — at least one of which should be included with your Linux distribution. To configure X correctly, you will need to know what type of video card you have (running the program SuperProbe may be helpful), the amount of memory your video card has, and the capabilities of your monitor (the resolutions and refresh rates that it supports).

Most of the options should be self-explanatory, however if you run startx after finishing the configuration and X doesn't start, you may have to do some tweaking.

Often the main causes for X failing to start are higher resolution and refresh rate settings than your monitor can handle. Reconfiguring for a lower resolution may fix the problem. If it doesn't, it's worth going to <http://www.xfree86.org/> and checking support information for your video card, since not all cards are supported.

To find out exactly what went wrong, take a look at what X is reporting when it fails to load. This should be informative enough. An error message along the lines of 'None of the configured devices were detected' means that X could not locate the video card you selected. Another common error, 'No valid modes found', means that the resolution(s) you selected could not be used because they would not work with the monitor specifications you gave.

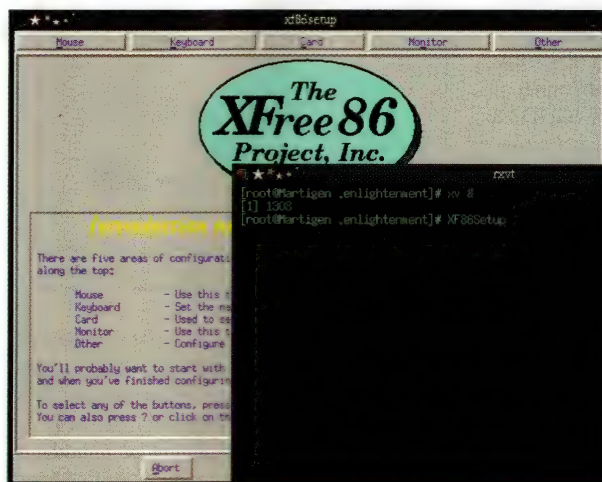
If X starts up OK, but the display is off-centre or the wrong size, just run xvidtune to adjust the display.

X colour depth

Strangely enough, X doesn't always start in the best possible resolution or colour

depth. If you think you're not in the colour mode or resolution you'd like, just open another terminal and edit the XF86Config file normally found around your /etc or /etc/X11 directory. Scroll down until you find a section that defines the type of server you're using, normally SVGA or an accelerated server.

Under this you should find a listing of each colour depth and the resolutions supported — X will try to use the first entry, which is normally 8-bit colour. Simply



rearrange the entries so that 16, 24 or 32-bit colour is first. X should happily start in this mode, assuming your video card can support the colour depth at the specified resolution. Similarly, to get X to start in a higher resolution, put the higher resolutions first in the list.

Lastly, while running X you can press Ctrl-Alt and then + or - to increase or decrease the resolution.

Connecting to the Internet

Connecting to the Internet with Linux can be slightly more difficult than with Windows 95, primarily because your Internet service provider will have instructions and scripts already prepared for Windows, but not for Linux.

Some distributions include a graphical tool to set up PPP; for example, Red Hat includes a program called netcfg. Instructions on using netcfg are available from <http://www.redhat.com/support/docs/rhl/>

PPP-Tips. If you have a different distribution, take a look at EzPPP, found on this month's **apcmag.cd**.

Net knowledge

Getting around the Net with Linux is often done using traditional character-based Internet tools such as FTP and Telnet.

The best browser to date is Netscape Navigator, and you can find the Linux version on this month's **apcmag.cd**.

However, most Linux installations will also come with a very handy text-mode browser called Lynx. If you want to browse from a term or don't care for graphics, Lynx is a very fast and well-respected browser.

If you use Navigator, be sure to set up a link between the Netscape installation directory (/usr/local/netscape) and your BIN directory (/usr/local/bin) by issuing the command: `ln -s /usr/local/netscape/netscape /usr/local/bin/netscape`. The link puts

Netscape in your default path and allows you to start it when not logged in as root.

More often than not you'll find yourself using FTP to retrieve files. The commands you need to know here are BIN to set the transfer mode to binary, HASH to turn on '#' mark printing so you know the transfer hasn't stalled, LCD to set a download directory (Local Change Directory — a standard CD command will change directory on the FTP site), GET (or MGET — multiple get) to retrieve files and, of course, LS (or LS -LA for a more complete list) to list the contents of a directory.

Some Linux installations come with a very powerful FTP program, called NCFTP, which makes things easier by defaulting to binary transfers, bookmarking sites you've been to previously (and automatically logging you in when you revisit them), combining 'mget' into the 'get' commands, and offering a variety of transfer status displays.

Most files you download for Linux will

be compressed in what's loosely known as a 'tarball'. These files are the result of two methods of compression — your standard ZIP (using the same algorithm as DOS/ Windows PKZip) and TAR, a method which doesn't actually compress data but instead appends all files to create one large file before compressing. By doing so, the ZIP algorithm can actually compress more space than it can over separate files.

Uncompressing tarballs (found as *.TGZ or *.TAR.GZ) can be done by first unzipping them with GZIP (`gzip -d [filename]`) and then un-tarring with TAR (`tar -xvf [filename]`). Alternatively, you can un-tar and un-zip at the same time using TAR by issuing the command `'tar -zxvf [filename]'`.

Window managers

One of the nice things about X is that it is very flexible. The look of your desktop is controlled by a program called a window manager, whose purpose is to handle the display and control of menus, window borders, and your interaction with the windows.

In the Linux community, FVWM is probably the best-known window manager, and it is the default for many X installations. FVWM95 is a window manager based on FVWM with extensions to give your desktop a similar appearance to a well-known operating system. CDE is the standard desktop on other Unix systems and has recently been ported to Linux. It is commercially available from Red Hat Software and Xi Graphics. There are also a few window managers under development such as Enlightenment, which has the aim of being "the most configurable and best-looking desktop management program", and WindowMaker, which attempts to emulate NextStep's window manager.

Information on many of the different window managers, along with screenshots, sample configurations and more is available at <http://www.plig.org/xwinman/>.

Accessing devices

Accessing files on CD-ROMs, floppy disks, and other partitions on your hard disk is generally done by mounting the device. This means that rather than having separate drive letters to refer to different devices, there is only one directory structure with the different devices accessible through subdirectories.

For example, a CD-ROM drive could be mounted in the directory `/mnt/cdrom`, and a DOS partition could be mounted in the directory `/dos`. The main advantage of this sort of system over separate drive letters is that it makes the configuration of your hardware irrelevant to the programs you run. This is a good thing if you ever want to move data to a different disk (for example, if you install a new hard disk).

To get a list of all currently mounted file systems, type `'df'`. This will also show the amount of space used and available in kilobytes for each device.

If your DOS partition is not already listed, you can add it to the `/etc/fstab` file so that it will be mounted whenever Linux starts. The file has one line per file system to be mounted, and the fields on each line represent the device, where it gets mounted (the 'mount point'), the file system type, and then any additional options. An entry for a DOS file system located in the first partition of the first IDE hard disk would appear as:

```
/dev/hda1 /dos msdos defaults 0 0
```

Before a file system can be mounted, the directory to mount it on must already exist, which for this example could be done by typing `'mkdir /dos'`. For long filename support for Windows VFAT drives, the file system type `'msdos'` should be



changed to `'vfat'`. To mount this file system after adding its entry without having to reboot, the command would be `'mount /dos'`.

Currently Linux supports various Unix file systems, standard DOS (FAT) and Windows (VFAT) file systems and OS/2's HPFS file system.

Using floppy disks or CD-ROMs is very

similar to using a DOS partition. The device equivalents for drives A: and B: are `/dev/fd0` and `/dev/fd1` respectively. The equivalent devices for CD-ROMs can vary depending on the type of interface used, but the most common are `/dev/hdb`, `hdc`, or `hdd` for IDE CD-ROMs or `/dev/scd0` for a SCSI CD-ROM. The file system for CD-ROMs is almost always `'iso9660'`. Also, for removable media like floppy disks and CD-ROMs, you should change the word `'defaults'` to `'defaults,noauto'` so that it does not automatically get mounted at bootup.

For removable media you must always unmount (`umount [device]`) the device before removing the media. Failing to do so could corrupt data on the disk.

Things to remember

Not sure what a command does? Just type MAN followed by the name of the command and you'll get a 'manual' describing all the switches and how to use them.

If you're new to Linux, you quickly begin to realise that navigating the directory system can be a very key-intensive pastime. This hasn't been overlooked in the development of Linux shells and you can simply press Tab to invoke the shell's command completion feature. Press Tab at any time after typing the beginning letters of a directory or file and the shell will attempt to match

your characters with those it finds in the directory path you're navigating to. If two or more matches occur, pressing Tab again will show those programs and directories that match your criteria.

Learn to use Tab frequently. After a while it will become second nature and navigating becomes a breeze.

Lastly, whenever you run a program, be sure to force the directory you're running from to be your current directory by prefixing the command with `'./'`,

for example, `'./netscape'`. This saves you accidentally running a program that might exist somewhere in your search path. Especially when logged in as root, accidentally running the wrong command may cause damage.

As with Tab, get into the habit of doing this and you know it won't be your fault if your system mysteriously falls apart. ■

How to keep afloat with floating point programming. **By Michael Smith**

Developers Corner

I recently received an entry for the Bug of the Month contest which reported a problem with the MS Windows 3.11 Calculator program. The person who contacted us had computed the equation $0.11111 - 0.1111$ and got the result 0.000009999999999996 . That, of course, is the wrong answer. Or is it?

I entered the two values into an Excel spreadsheet, and computed their difference using Excel the SUM() function. The result came out 0.00001, just as you would expect. I then set the format to 20 decimal places. Mysteriously the result, when expressed to that precision, came out as 0.000009999999999999612.

Well, it could have been be a pervasive software bug. It was time to do what any Real Programmer would do at a time like this: I wrote my own C program. Just to be really certain, I didn't use my Microsoft C compiler.

Searching the outer reaches of my hard disk I located my Absoft C compiler and compiled the following:

```
#include <stdio.h>
int main()
{
    printf( "%.20f\n", 0.11111-0.1111 );
    return 0;
}
```

I ran the program and I got: 0.000009999999999999612.

Well, I was running on a Pentium, but it's not old enough to have a chip with the infamous FDIV bug. So what's going on? To understand we need to explore the depths of floating point arithmetic.

Integers

Computers, as a species, are generally comfortable with only one type of number: a binary integer. Binary, or 'base two', numbers are represented by as a series of zeros and ones: 0 is zero, 1 is one, 10 is two, 11 is three, 100 is four and so on.

The number 1918000000, the size of one of my hard drives, is represented as 1110010010100100101101110000000. For some fairly obvious reasons, programmers don't like working in binary, so they usually work in decimal (base 10) or hexadecimal (base 16) and rely on the operat-

biased exponent (E), and a 1-bit sign (S). These fields are stored contiguously in two successively addressed 32-bit words, as shown in Figure 1.

In big endian architectures such as SPARC and MIPS, the higher address 32-bit word contains the least significant 32

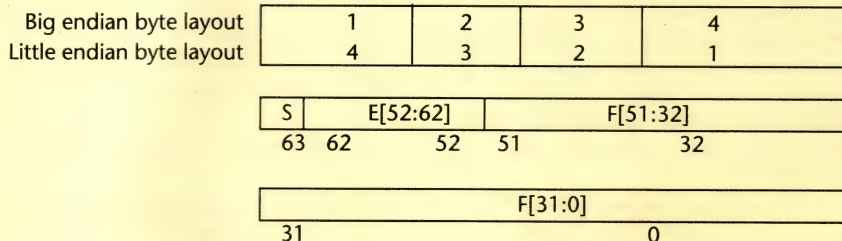


Figure 1: Bit layout of IEEE double format.

ing system or the compiler to translate. However, under the hood the binary representation remains.

Getting real

Floating point, or 'real', numbers need a more complex representation. Over the years there have been many weird and wonderful formats used, but these days many systems use the IEEE standard floating point format. I will concentrate on the 64-bit double-precision floating point format, but the others are similar.

The IEEE double format consists of three fields: a 52-bit fraction (F), an 11-bit

bits of the fraction. In little endian architectures such as Intel and the common PowerPC configuration, the lower address 32-bit word contains the least significant 32 bits of the fraction.

The formulas to convert this binary representation back into a floating point number are shown in Figure 2.

The heart of the problem

Here we see the crux of the problem. When using integers, every decimal value within the appropriate range may be represented exactly by a corresponding binary value. When using floating point numbers, this is

not the case. Floating point numbers are represented by the nearest IEEE number — which in many cases is slightly different from the requested number.

It turns out that both 0.11111 and 0.1111 can both be represented exactly in IEEE floating point,

Double-format bit pattern	Value
0 ~ e ~ 2,047	$(-1)^s \times 2^{e-1,023} \times 1.f$ (normal numbers)
e = 0; f „0	$(-1)^s \times 2^{-1,022} \times 0.f$ (subnormal numbers)
e = 0; f = 0	$(-1)^s \times 0.0$ (signed zero)
s = 0; e = 2,047; f = 0	+INF (positive infinity)
s = 1; e = 2,047; f = 0	-INF (negative infinity)
e = 2,047; f „0	NaN (Not-a-Number)

Figure 2: Values represented by bit patterns in IEEE double format

but their difference, 0.00001, cannot. The value 0.00000999999 999999612 is the nearest number which can be represented in a double-precision IEEE floating point number. If you output this to 17 decimal places or less, the user will never know the difference — but there is a small, and significant, difference.

Living in an approximate world

Knowing that every floating point value must affect the way you program, consider this:

```
#include <stdio.h>
int main()
{
    double d = (0.11111-0.1111) * 1.0e5;
    printf( "%f converted to an integer is
%d\n", d, (int)d );
    return 0;
}
```

You may be surprised when you run this program and get:

1.000000 converted to an integer is 0

However if you want some real fun, try:

```
double d = 0.111111-0.11111;
while (d!=1.0) {
    printf( "%f\n", d );
    d *= 10;
}
```

Can you spell 'infinite loop'?

Once you are aware of these sorts of problems, it's relatively easy to work around them.

Before truncating a floating point number to an integer, you can add a very small amount.

For example:

```
#define EPSILON 0.0000001
#define TO_INT( x ) ((int)((x)+EPSILON))
```

Similarly, when testing for equality you can define a threshold of error. This must be done with care, however, as a threshold which is suitable for very large numbers may be unsuitable for small numbers, and vice versa.

A good all-purpose comparison macro is:

```
#define THRESHOLD(x) fabs((x)/1.0e7)
#define EQUAL(x,y) (fabs((x)-(y)) ~=  
    THRESHOLD(x))
```

This comparison is robust in that it works for very large and very small values.

Endianness

Intel-based computers store multibyte words with the least significant byte first and the most significant byte last. Computers that do this are known as 'little endian'. The PDP-11 and VAX family of computers are also little endian. Some other computers such as the IBM RS6000 and those based on SPARC, MIPS or Motorola chips store the most significant byte first and the least significant byte last. These are known as 'big endian' computers.

For example, the hexadecimal number 0x11223344 is stored in a 32-bit integer.

On a little endian computer that would be stored as:

0x44 0x33 0x22 0x11

On a big endian computer that would be stored as:

0x11 0x22 0x33 0x44

The PowerPC is unusual in that it can operate in either big endian or little endian mode. Big endian is the default and is used most often, but little endian mode may be selected at startup.

Of course, other byte orderings are possible, and some very old computers do use other configurations, often known as 'middle endian'. However, these are now quite rare and most modern computers use either a big or little endian architecture.

When reading binary data files which have been created on another computer, it is often necessary to convert the data from big endian to little endian or vice versa. This is relatively simple to do.

```
void swap_bytes( void *buff, int len )
{
    char *cbuff = buff;
    int i0, i1;

    for ( i0=0, i1=len-1; i0<{i1; i0++, i1-- } {
        char tmp = cbuff[i0];
        cbuff[i0] = cbuff[i1];
        cbuff[i1] = tmp;
    }
}

int main()
{
    int some_val;
    double another_val
    /* read the values .... */
    swap_bytes( &some_val, sizeof(int) );
    swap_bytes( &another_val, sizeof(double) );
    /* etc ... */
    return 0;
}
```

It will return true if the values are equal for seven significant figures. This is suitable for single and double precision floating point numbers. If you need higher precision you can simply increase the value 1.0e7. Be warned, however, that single precision floating point data only has seven significant digits, so you will need to work only in double precision or better if you increase the value 1.0e7.

The weakness of this macro is that it is a little slow, making two calls to the fabs() function. Normally this is not a problem, but in a tight loop it may affect performance to a significant degree. In that case

you must finetune the macro using any knowledge you have about the data.

Similar macros or functions aren't difficult to develop for other languages.

A bug or not?

So does the Windows Calculator have a bug? I think it's less a bug than a limitation. It's not producing the answer you expect, but is it possible for it to do better? Perhaps the program should limit the number of decimal places it outputs. Other than that, we're stuck with the approximate nature of floating point programming■

We examine recursive functions, look more closely at JavaScript's input/output methods, and learn the top-down approach to programming. **By Travis Simon**

JavaScript

Recursion

Recursion occurs when a function calls itself within its own code block. Recursive functions can be a conceptually difficult idea to understand, so don't be put off if you're confused the first time round.

The best example to illustrate recursion is the factorial function. Factorials are calculated by multiplying a number by each successive integer less than itself, but greater than zero. For example, the factorial of 5 (5!) is calculated by the following expression:

$$5! = 5 * 4 * 3 * 2 * 1 = 120$$

To understand the recursive factorial function, you have to be able to make the conceptual leap from the previous statement to this statement:

$$5! = 5 * 4! = 5 * 4 * 3! = 120$$

The progression outlined above can be written as:

$$x! = x * (x-1)!$$

This statement lends itself well to an elegant recursive solution. To calculate the factorial of a given number, you can multiply the value by the factorial of the number minus 1, as long as the number is not equal to one. If the value of the number is one, stop the recursion process. In code, the function looks like:

```
function factorial(x)
{
  if(x == 1)
    return 1;
  else
    return (x * factorial(x-1));}
```

When factorial() is called, with the value of 3, for example, the function first checks to see if the argument is equal to 1. In this case, it is not, so the next step returns the value of 3 * factorial(3-1). Before this value can be returned to the calling program, the value of factorial(3-1) must be calculated. The function factorial(2) returns (2 * factorial(2-1)). Finally, the function factorial(1) returns the value of one. Once this value is returned, the next function above it — factorial(2) — can

evaluate the expression (return 2 * 1). This result is then sent to the original function call — factorial(3) — and that function can evaluate the expression return (3 * 2).

Like a loop, a recursive function must move to an ending scenario, and have a statement to end the recursive calls. However, there are some dangers to using recursion, as CRASH.HTM (found on this month's apcmag.cd and apcmag.com) illustrates. Calling functions takes a finite amount of time, and a program that relies heavily on recursive function calls will suffer from an (albeit minimal) performance degradation. Further, the internal tracking of recursive function calls uses large amounts of system resources and memory.

The last time I wrote a program like CRASH.HTM, it brought the whole system down. These days, both Netscape Navigator and Microsoft Internet Explorer have improved memory management, so only the script crashes, and an error is reported. With 32M of RAM on my home system, I can make approximately 165 and 245 recursive function calls in Navigator 3 and IE3 respectively, and more with the latest versions. Funnily enough, if we believe what IE3 reports, it has enough memory to store the number infinity, but not 250 recursive function calls!

I/O functions

Input and output are two essential components of any program. Although there have been some brief explanations with previous examples, the methods have not been formally introduced. The first is the write() method.

Write() is a method of the document object and, as such, it operates on HTML documents. The write method does not write text to the screen, but to the HTML that produces the Web page. Therefore, any arguments sent to the write() method must be HTML formatted. The two most used tags will likely be
 and <p>.
 is a line break, which moves text down to the next line. <p>, on the other hand, is a paragraph tag, and is equivalent to two line breaks.

The writeln() method is the same as the write() method, except that it appends a carriage return on the end of the string. The carriage return does not affect the onscreen representation of the method, but changes the way the HTML is formatted.

Unless you are writing into a <pre> block (preformatted text block), the only difference the end user might notice is if they choose the View Source option from within the browser (and the browser displays the WYSIWYG HTML source, not the JavaScript). If you use the write() method exclusively, the HTML will be one long line of uninterrupted text.

Another useful method is the alert() method, which produces a pop-up dialog box. The dialog box contains a graphical exclamation mark, the phrase 'JavaScript alert!', the string supplied as an argument, and an OK button. The alert() method is most useful to convey important information that doesn't require anything other than acknowledgement from the user.

Sometimes, however, you might need to ask for the user's acceptance before proceeding with an operation. In this case, the confirm() method is most useful. The confirm() method presents the same information as the alert button, with a few exceptions: the phrase 'JavaScript confirm:' appears instead of 'JavaScript alert!', a graphical question mark replaces the exclamation mark, and a Cancel button is added.

The prompt() method will return either true, if the OK button is pressed, or null, if the Cancel button is pressed.

Finally, a program will often require the user to enter information into the system. One of the easiest ways to get user input is with the prompt() method. The prompt() method presents the user with a pop-up dialog box containing the string sent as an argument, a text box, an OK button, and a Cancel button. The string the user supplied in the text box will be returned if they press OK, or null if the Cancel button is pressed. Finally, unlike the other methods, the prompt() method receives two arguments; the first argument is the text to be displayed to

instruct the user, and the second argument is the default text that appears in the text box.

The syntax for the I/O functions is:

```
document.write(HTMLString);
document.writeln(HTMLString);
alert(alertString);
returnValue = confirm(confirmString);
returnValue = prompt(question, default);
```

The top-down approach to programming

Learning the syntax of a programming language is not an overly difficult process. The real challenge, however, is learning to use those basic building blocks to write complete, useful, clean and error-free code. Many eager programmers, when faced with a programming challenge, will sit down at the keyboard and start keying in code. The problem with this approach is that the code usually ends up being more complicated than necessary, and often the programmer will find that they've coded themselves into a hole that they have to dig their way out of. Although major problems are not likely to surface in smaller JavaScripts, large projects can easily suffer from poor preparation. The key to avoiding this problem is with good planning. One popular method of approaching problems is called the top-down approach to programming.

For this example, I am going to use a real-life task that I recently tackled using the top-down approach. This example was not written in JavaScript, but the concepts are the same for any language.

One of the most time-consuming aspects of this column is doing the formatting for the examples that appear on **apcmag.cd**. After manually marking up the first two

JavaScript articles, I decided to write a word macro to help. To begin working on the macro, I grabbed a *pencil and a piece of paper*. The first step in planning a program is to write down the major objective of the program:

- Create a macro to format an example for use on the CD.

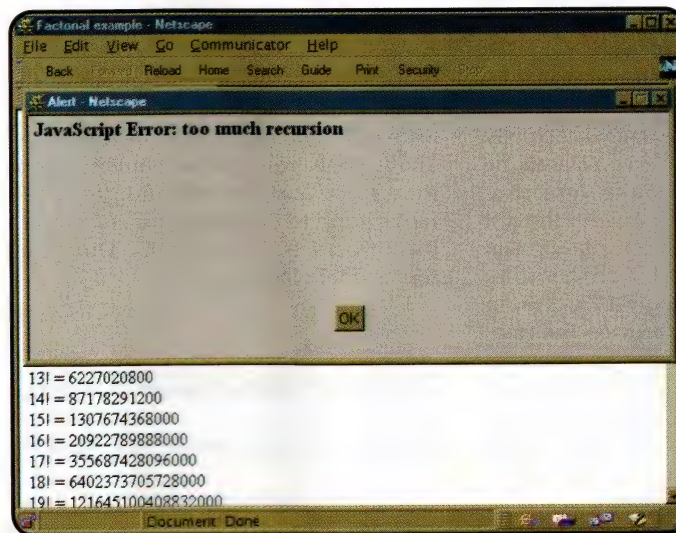
That task alone is extremely daunting, and it's hard to know where to begin. The next step is to break down

that task into smaller tasks:

- Pick a name for the set of documents.
- Format the example page.
- Create the source page.

With each step, the code becomes more manageable. For example, the second task can be broken down further:

- Find the beginning of the `</body>` tag.
- Create hyperlinks to the main page and source page.



At this time, each of those two separate tasks is manageable. The idea is to break

down the main task into a tree of subtasks. You may have noticed that each of the smaller tasks becomes well suited for a function. Further, you will often find that many of the subtasks are the same, and one function will satisfy the needs of a number of the subtasks. For example, one of the subtasks below 'Create the source page' is to create hypertext links from each `// Analysis` string. Part of that task includes finding the beginning of `// Analysis`, much like finding the beginning of the `</body>` tag earlier.

Once you have dissected a major problem into all of its component tasks, the next step is to start building the program from the bottom up. Begin with the simplest function to implement and code it. The next step is to write a program that only tests that one function. Once the function is working correctly, you do the same for another function. From here, it is just a matter of assembling the pieces, and

testing the program at every step. Before you know it, you've written a large and complex program from small and easily managed pieces. Examples on this month's CD feature the complete program development cycle, from planning to implementation, in greater detail than here, so be sure to have a look.

Next month we'll take a look at frames and some of JavaScript's related

objects. Until then, feel free to email me at trav@acp.com.au.

I need a new PC.
Which should
I buy?



Where's
all this tech-
nology heading?
What's it mean for me?



This month we talk the tentative subject of spiders and bots, and the arcane art of META tags. By Lee Borkman

HyperText

META tags. If you're the kind of person who likes to look under the hood, if you're the type to sneak a peek at other people's HTML, then you will have seen them lurking about near the top of the page, dark and mysterious. Just what are they doing there?

They don't seem to have any effect at all on the way the page looks, but they must be there for a reason. The truth is that META tags contain information that is probably not particularly interesting to the page's immediate audience.

So who or what would find this information useful? Well, servers and browsers are obviously bits of software that might want some information about a page, but there are others.

Most importantly, search engines, Web catalogs and indexes often rely on META tags. If you have a commercial site, or if you have any kind of site that you actually want people to visit, then you should be using META tags to make sure that AltaVista, HotBot, Yahoo and all the rest know what your pages are about, and where they can be found. And that's not the only reason for using META tags. In fact, META tags really provide information that may or may not be useful at some time in the future. Who knows when some evil genius will write an application that performs scintillating tricks using some seemingly mundane META information in your page? Be prepared.

The basic form of the META tag is simple. Most applications require the tags to be inside the `<HEAD></HEAD>` section of the page. There are two possible variants (see 'A word about quotation marks'):

```
<META NAME="x" CONTENT="y">
<META HTTP-EQUIV="x" CONTENT="y">
```

The first form of the META tag defines simple name/content pairs like these:

```
<META NAME="author" CONTENT="Lee Borkman">
<META NAME="date" CONTENT="1997-09-31">
```

Tags like this could be used by a search engine to find all pages published since January 1997 whose author contains the string 'ork'.

The second variant assigns values to HTTP environment variables which are passed from server to browser via the CGI (Common Gateway Interface). You can see the environment variables associated with your document by selecting the View Document Properties option in your browser. HTTP-EQUIVs should be used with caution, as there may be a conflict if you try to define HTTP variables that the server has already defined.

Let's take a look at some practical uses for META tags.

Client-pull

If you have recently moved your home page to a new site, then you will want to make your regular visitors aware of the fact. It's usual to put up a notice at the old location, including a link to the new page. That's pretty easy, but we could be just a little more flash by including an automatic jump to the new page. For this, we use the classic 'client-pull'. Our page source might look like this:

```
<HTML>
<HEAD>
<META HTTP-EQUIV="Refresh" CONTENT=
"5;
URL=http://myserver.com.au/newpage.htm"
>
<TITLE>This page has moved</TITLE>
</HEAD>
<BODY>
This site now has a new address.
Click <A
HREF="http://myserver.com.au/newpage.htm">here</A>,
or wait for your browser to take you there
automatically.
Don't forget to bookmark the new location.
</BODY>
</HTML>
```

Most browsers will recognise the HTTP variable "Refresh". In this case, the browser will wait five seconds, and then load the new URL, 'http://myserver.com.au/newpage.htm'. Note that the CONTENT string contains the delay (in seconds), a semicolon, and the URL. The quotation marks surround the entire string.

Cookies

We've looked at cookies recently; we used JavaScript to set and test the cookies. If you just need to set the cookie, you can do this with an HTTP-EQUIV META tag:

```
<META HTTP-EQUIV="Set-Cookie" CON-
TENT="VarName=x; expires=Thursday, 16-
Oct-97 10:30:00 GMT; path=/; domain=
apcmag.com">
```

Use any VarName you wish. As is usual with cookies, you can leave fields out. If the expiry date is not set, then the cookie is volatile — it will not be saved when the browser is shut down.

Cache control

There are times when the content of a page is updated frequently, and there are occasions when it's essential to make sure that your readers really are seeing the most recent version of your page. You have a couple of options here. The first uses the HTTP variable, "Expires":

```
<META HTTP-EQUIV="Expires"
CONTENT="Thursday, 16-Oct-97 10:30:00
GMT">
```

When your browser caches the document, it should be marked with this expiry date. After that date, your browser will not use its cached version, but will ask for a fresh copy. Although it's not really standard, you can set the expiry date to '0', in which case the document will not be cached at all.

There is a nicer way to do that, however. Use the HTTP "Pragma" variable:

```
<META HTTP-EQUIV="Pragma" CONTENT=
"no-cache">
```

This stops the document from being cached, and even prevents it from being included in your browser's history list. It is good for sensitive, high-security information (like forms with your credit card information).

Don't get framed

Do you hate those sites that use cheesy

frames, the ones that provide links to other sites, so the other sites then pop up within the original frame? You're stuck with those ads, and a stingy little piece of browser real-estate. Even worse, what if that other site is *your* site? You want people to see it in its pristine form, without somebody else's clutter. Try this:

```
<META HTTP-EQUIV="Window-target" CONTENT="_top">
```

If you put this tag in your home page, then the page will demand to be displayed in the browser's top-level window, effectively ousting anyone else's despicable frameset.

Get noticed

When you want people to find your page, it's essential that you make life easy for all of those little spiders and bots that are crawling around the World Wide Web. These creatures are sent out by the owners of search engines to chase links and report back to their masters. Most of these bots examine the text in your pages, but you can really help them out by including "description" and "keywords" META tags. (Note that "description" and "keywords" are not HTTP-EQUIV. They are merely names that have become conventions, or de facto standards.)

```
<META NAME="description" CONTENT="A brief tutorial on the use of HTML META tags.">
```

```
<META NAME="keywords" CONTENT="authoring, meta, web, bot, tutorial, workshop">
```

Search engines use the keywords to index your page, and usually include the description when listing your page in a search result. You can include one word over and over again if you want to boost

A word about quotation marks

Have you ever wondered about the quotation marks used to surround attribute values in HTML tags? Have you noticed that wicked Web authors (like me) are always (or almost always) leaving them out, or using single quotes instead of double? So what's the rule?

I haven't actually checked the W3C standard lately, but I believe it calls for double quotation marks around every attribute value. But browsers try to make informed guesses about authors' intentions whenever they encounter non-standard HTML. Otherwise we'd be seeing nothing but error messages every time we go surfing.

In the case of attributes, most browsers will not demand quotation marks at all. It is

just assumed that the first whole word after the equals sign is your value. Fair enough, really. So you only need to use quotes if your attribute value contains spaces. In practice, that usually means the ALT attribute in an IMG tag, a few sundry NAME and VALUE attributes in from elements, any embedded scripting, and the CONTENT of a META tag.

Leaving out quotation marks saves time and bandwidth, and can make your HTML more legible. Be warned, however. Quoting attributes can make life much easier when automating page editing. This is because quotation marks are an unequivocal landmark for your sophisticated search-and-replace routines.

your site's 'relevance', but that's pretty suspect, and bots are getting wise.

Some pathetic low-lives have taken to abusing the "keywords" META tag. You can put words in the keywords list that have nothing to do with your site.

If you choose your list cleverly, you can ensure that your page will match just about any conceivable search criteria. That might sound like a good idea, but it's guaranteed to annoy the hell out of people, and rightly so. Don't do it.

Don't get noticed

Up to this point, I've been assuming that you want people to see your pages. There are, however, times when you absolutely do not want people dropping by for a quick look. Luckily, there is a new standard for asking bots not to index your page or follow your links. It's called the Robot Exclusion Protocol. You could use a file called ROBOTS.TXT to tell robots where to go, but you can usually only do

that if you administer your own domain. Luckily, there's a META tag:

```
<META NAME="ROBOTS" CONTENT="NOINDEX, NOFOLLOW">
```

Of course, it's really up to the bot whether or not to respect your wishes, but it's at least worth a try.

These are just a few of the uses for META tags, and there are new uses being invented every day. That's really the point. META tags can evolve without having to wait for the HTML standard to catch up — the standard allows extra functionality to be introduced without compromising the standard itself.

Because META tags are constantly changing, it's hard to find a decent, comprehensive reference. Books are out-of-date long before they are printed, so keep checking out your favourite online sources. As always, remember to check your pages on all the browsers you can lay your hands on. ■

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Where's
all this tech-
nology heading?
What's it mean for me?



Here is a list of all the Shareware files on this month's *apcmag.cd*.
Simply browse to the Workshop section to find the files and related reviews.

Shareware summary

Windows 95

Maplay 1.2 and 1.9

No-frills, high-speed Windows 95 player for MP3 and other audio files.

Seq-303 2.0

Analog sequencer program capable of great techno effects with a good MIDI card.

WinAmp 1.55

Nice MPEG audio player with eight-band equaliser and excellent playlist manager.

Audio Architect 3.0

Powerful analog synthesiser emulator with a wide range of modules 'wired' onscreen with mouse.

Clarion 0.9.1

Very friendly MIDI and audio CD player with excellent and straightforward file/track-management features.

Yamp 2.0

Novel music player for most common Windows formats, featuring numerous off-beat design options.

OS/2 Warp

Commander 2.25

Comfortable with the Windows file manager? You'll feel right at home with Commander, a well-written PM file manager with all the features you need, in all the right places.

Reader Request — InspectA

An Australian program, InspectA is a text-based file manager/viewer and FidoNet mail manager.

FileStar/2 2.00.3d

Very powerful, extremely intuitive and hugely configurable. FileStar/2 offers PM-based file management with many extra functions built in, including direct access to the Undelete directories on your hard drive(s).

The DiskJockey

A very pretty PM file management and navigation application, The DiskJockey also includes integrated support for multimedia (BMP, GIF, TIF, MPG, MID, AVI, WAV, AU and JPG files).

Mac OS

Escape Velocity 1.0.5

One of the most impressive, playable and ultimately frus-



Have some fun with Harry the Handsome Executive.

trating games ever created for the Mac. A combination of galactic-trading, arcade and strategy styles make Escape Velocity a game which is truly defined by the playing style.

Cyclone II

A remastered version of the classic space arcade game, Cyclone. Cyclone runs in 256 colours on a 512 by 384 screen area, making it possible to play even on older PowerBooks.

Harry the Handsome Executive 1.0.0

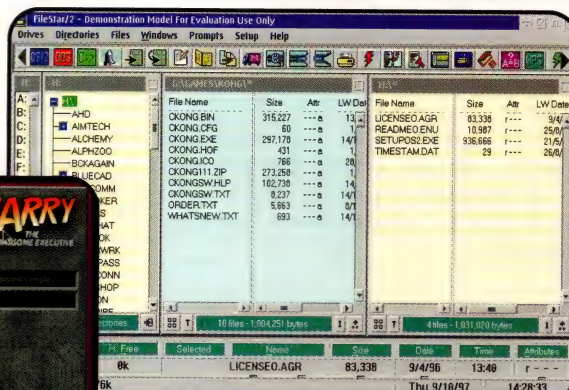
A cute new action game without any beasts or aliens to kill. Some of the things that harm Harry are the irate soda machine, the psychotic mail room cart and bored dart-throwing middle managers.

Linux

Gimp 0.99.11

Freely distributable software suitable for tasks such as photo retouching, image composition and image authoring. Offers many features provided by commercial packages and more.

Xv 3.10av



FileStar is a must-have for OS/2.

Interactive image manipulation tool for the X Window System. Operates on many image file formats. Very useful.

Pixcon & Anitroll 1.05

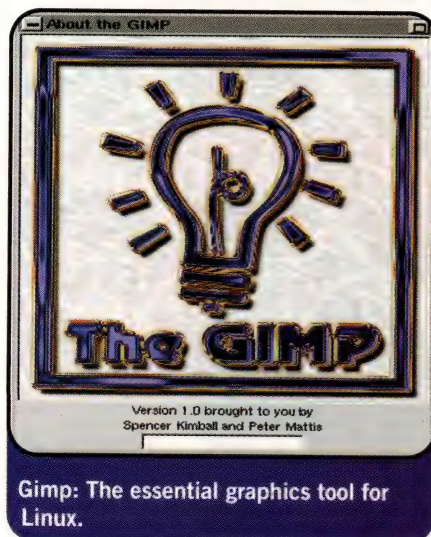
Free 3D rendering and animation package. Relatively fast, available for SGI, Linux and DOS.

XaoS 2.2

XaoS is a fast, portable real-time interactive fractal zoomer. It displays the Mandelbrot set (among other escape time fractals) and allows you to zoom smoothly into the fractal.

Zgv 2.8

Linux VGA/SVGA image file viewer. Supports a wide variety of image file formats and display hardware.■



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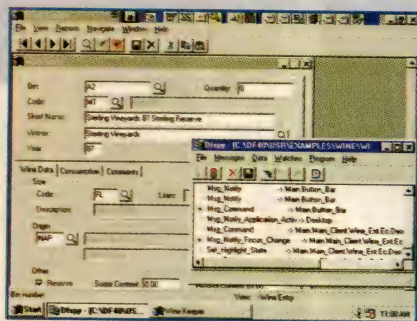
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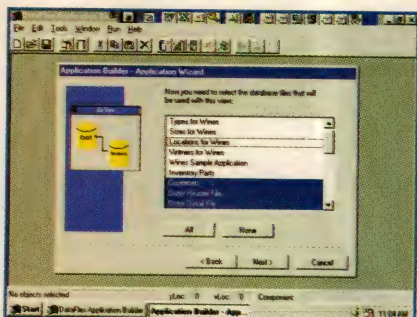
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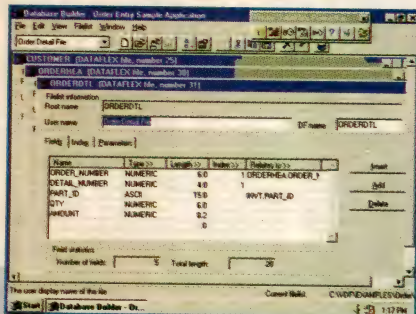
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DFSpy - Debugging Tool



AppBuilder - Application Wizard



Database Builder - Define your application workspaces

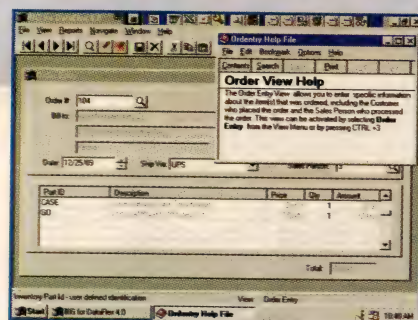
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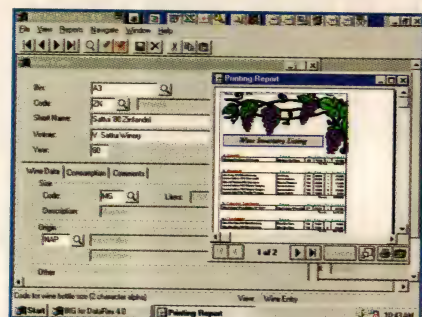
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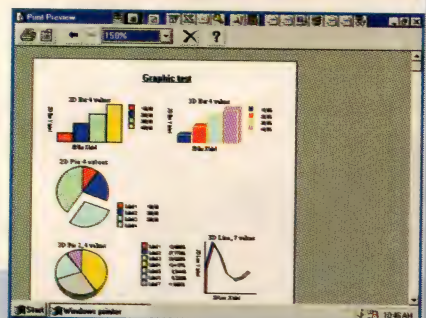
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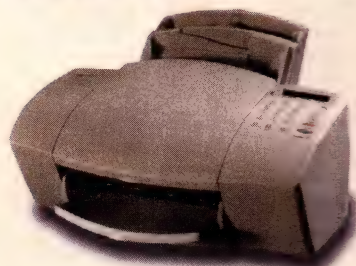


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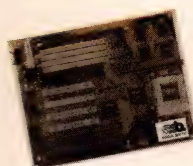


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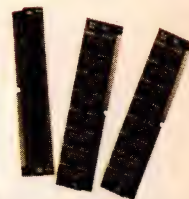
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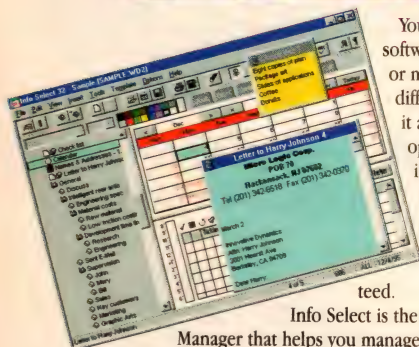


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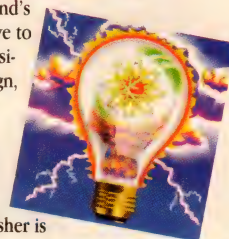
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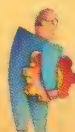
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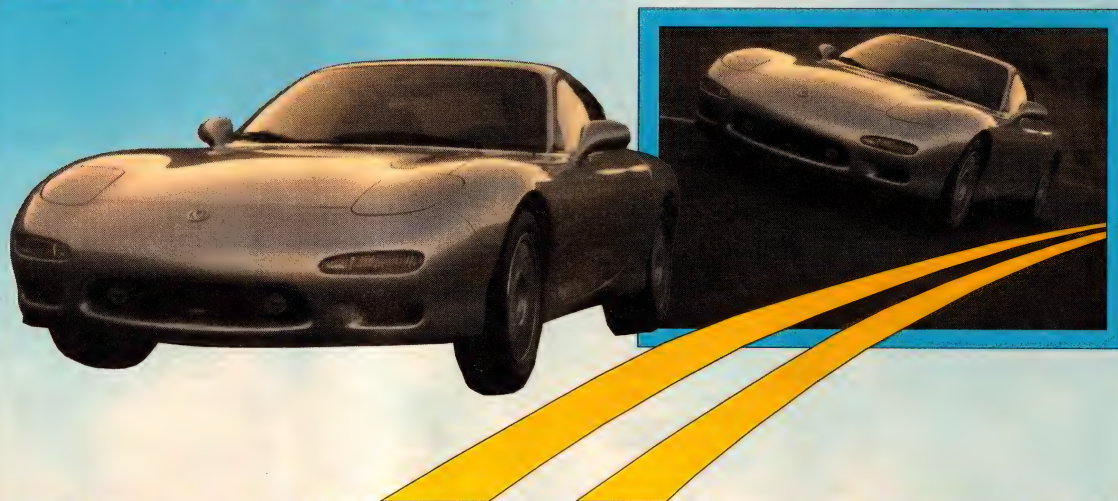


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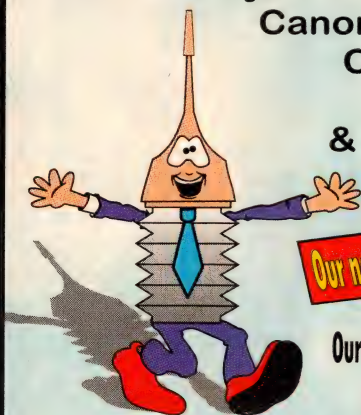
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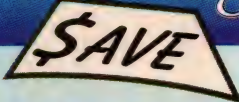
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CANON BJC-4000/4100/4200/4550 BC-20	8	18-BKL
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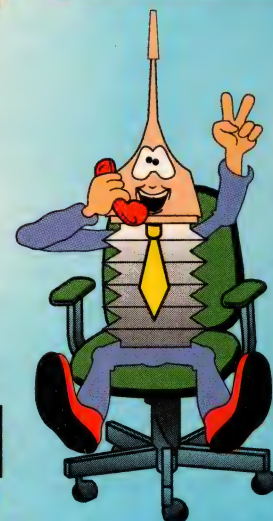
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HP Desk Jet 850C/855C/870C Series	3x6	30-CLR
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EPSON Stylus 820/colour II/IIs	3x12	24-CLR
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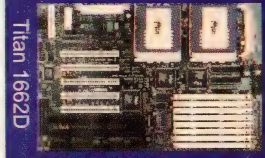
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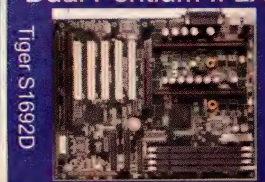


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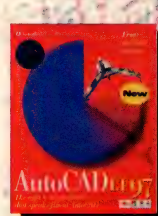
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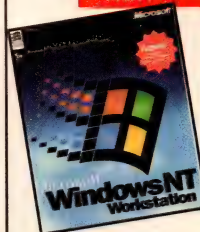


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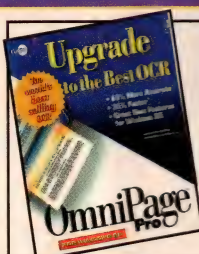
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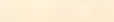
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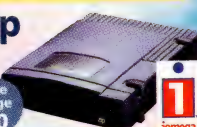
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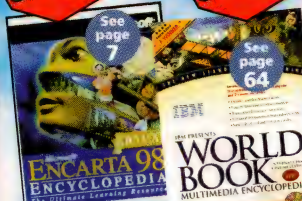
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IndexBy Product
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Adobe	23
All Computer Solutions	49
APC	32
Adobe	23
All Computer Solutions	49
APC	32
AutoCAD	23
Banksia	59
Borland	17
Canon	58
Checkmark	35
Cheyenne	41
Clarix	16
Compro	47
Corel	24
Creative	49
Cybec	29
CyberMedia	36-37
Diamond	46
Epson	55
Hayes	80
Hewlett Packard	7, 44, 56-57
IBM	9, 11, 34, 64
IMS	19-21
Indigo Pacific	14
Imega	50
Logitech	53
Lotus	18
Map Info	14
MAUS	13
McAfee	40
Microsoft	4-7
Microtech	54
Mitsui	22
MYOB	9
NetComm	80
NetGear	42
Ni-Tech	30-32, 39
Nodtronics	24
Norman	33
Quarterdeck	26, 27
Software	
Suppliers	28
SOHO	15
Sony	48, 50
Symantec	10, 25
SyQuest	51
TQA	15
Tracker	17
Transparency Language	63
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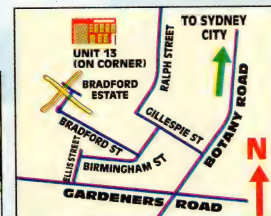
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Index

Category	Page
Product Listing	2
Introduction	3
SOFTWARE	
Microsoft	4-7
Hot Deals	8
PCs/Thinkpads	9
Business	10-19
Graphics	20-24
Utilities	25-40
PERIPHERALS	
Networking	41-42
Multimedia	43-49
Storage	50-52
Inputs	52-53
Scanners	54-55
Printers	55-58
Modems	59-61
Specials	62
Leisure	63-64



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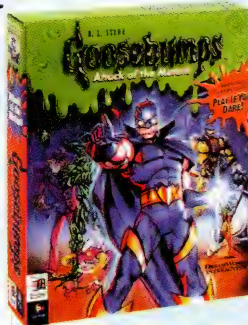
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Loose your self in the unique clay-animated world of the Neverhood! Enjoy slapstick epic clay adventures game cut from an entirely new mold.



MIC598 MS Money 98

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Chaos Island

Think fast. Move even faster. You control a team of scientists stuck on an Island packed with prehistoric perils!



MIC509 MS Chaos Island

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Age of Empires

Mix the tactical genius of Napoleon with the terror of Atila the Hun and the world will be yours!



MSS018 Age of Empires

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Close Combat

Take control of men who act like real soldiers! Defeat the enemy in non stop World War II action. Lead your men through the terror, fatigue and hell of war on to Victory!



MIC52 MS Close Combat

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MS Golf V3

It's a whole new ball game. Now better than ever, with lightning-fast Windows 95 game engine, superior graphics, and a realistic feel from the texture of the fairways to the birds singing.



MIC512 MS Money 98

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MS Intellimouse and MS Keyboard

- New IntelliMouse wheel allows you to quickly ZOOM and SCROLL in Office 97 applications.
- Improved control in Windows 95 and windows NT 4.0.
- Fast, easy navigation in Explorer 3.0.
- 3 year warranty
- All Office 97 applications will be compatible with the new mouse allowing the user to transfer zooming, scrolling and data zooming to the mouse.

MIC205 Microsoft Natural Keyboard **\$99**
 AUS168 MS Home Mouse **\$49**
 MIC542 MS Intellimouse **\$85**

Sidewinder Force Feedback Pro

A Quantum leap for joystick control

First there was sight. Then there was sound.

Now with Force Feedback technology, Microsoft adds the sense of touch to revolutionise the gaming experience.

- True Life Sensation
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- 16 Joystick Function, 8-way hat switching, trigger, throttle, wheel & handle movements.

MSJ001 MS SideWinder Force Feedback Pro **\$249**
 MSJ002 MS SideWinder Procession Pro **\$109**
 MIC546 MS SideWinder Game Pad **\$55**



Encarta 98 + Encarta World Atlas

Save the moments, share the memories with Microsoft Picture It! and your pictures, you can dazzle family and friends with greetings cards, calendars, collages, album pages and more, complete with backgrounds and templates.

MSS012 Encarta 98 Enc **\$59**
 MSS014 Encarta 98 Atlas **\$59**

MS Picture it!

Save the moments, share the memories with Microsoft Picture It! and your pictures, you can dazzle family and friends with greetings cards, calendars, collages, album pages and more, complete with backgrounds and templates.

MSS080 Picture It! **\$75**

MS Greetings Workshop

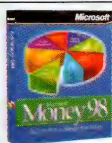
Create the quality of Hallmark at home! Easily create Hallmark-quality cards, announcements, calendars, certificates, banners, signs, and more with your home computer and Microsoft Greetings Workshop!

MIC538 Greetings Workshop **\$35**

Money 98

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New Interface: Smarter, easier to use interface features longer file names and simpler file and document management.

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Includes Internet starterkit 3.0



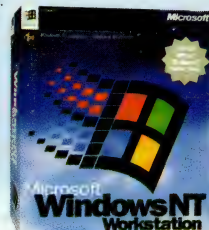
Buyers guide to Windows NT and Windows 95

	Windows NT Workstation 4.0	Windows NT Workstation 4.0
What is it?	An industrial-strength operating system for business applications now with the Windows 95 user interface	The easiest operating system for general business and home users
What you get	<ul style="list-style-type: none"> Highest level of performance Less emphasis on backward compatibility 	<ul style="list-style-type: none"> Increased reliability and performance over Windows 3.1 Greater emphasis on backward hardware and software compatibility Plug and play Better mobile and games support
What you need to run it	<ul style="list-style-type: none"> 16Mb of RAM 140Mb of hard disk space 	<ul style="list-style-type: none"> 8Mb of RAM 40Mb of hard disk space

Windows NT Workstation 4.0

Combines the ease of use of Windows 95 with the power of Windows NT. Windows NT workstation 4.0 combines the ease of use of Windows 95 with the reliability and security that have made Windows NT a success in the demanding workstation marketplace. This release also includes built in networking support, providing secure easy access to the internet.

new administrative features now make it easier to manage and control, which helps reduce the total cost of operation. The newest version of Windows NT Workstation includes these benefits: Greater ease of use of the Windows 95 user interface. Windows NT Workstation also includes Windows NT Explorer, providing users a hierarchical view, or tree of each drive and folder on the computer. Peer Web services enable low-volume personal Web publishing in corporate intranets.



WIN072 MS Windows 95 on CD U/G.....

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MIC464

MS Windows NT Workstation 4.0.....

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WIN071 MS Windows 95 on 3.5 U/G.....

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MIC486

MS Windows NT Workstation 4.0 U/G.....

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Microsoft Visual Studio 97

Microsoft Visual Studio 97 is the complete of visual tools from Microsoft.

Microsoft Visual Studio 97 Professional Edition gives developers the tools and flexibility to create high-performance Windows and Internet applications. Visual Studio 97 Professional comes with Microsoft Visual Basics 5.0, Visual C++ 5.0, Visual InterDev 1.0, Visual FoxPro 5.0 and the MSDN library Developer

Features Benefits

- Super fast applications with the native code compiler.
- Applications created with VB 5.0 run up to 20 times faster.
- Internet controls included.
- ActiveX control creation.
- Activex web application creation.
- Build state of the art Internet/intranet based applications.
- Make existing apps integrate with the internet using internet controls.
- Quickly build ActiveX controls that can be used by Internet browsers.
- Reduce cost of ownership through decreased setup and maintenance
- Intelligent design environment.
- Higher developer productivity: create applications faster and easier.

Reference CD-ROM. Visual Studio 97 comes with a license for one developer. Microsoft Visual Studio 97 Enterprise Edition adds the power of multi-tier, scalable solutions to Microsoft Visual Studio 97 professional. Visual Studio 97 Enterprise Edition gives developers the tools to integrate client/server development with Internet technologies. In addition to the suite of award winning development tools found in the Professional Edition, Enterprise customers will get the Microsoft Transaction Server, SQL Server 6.5 Development Edition, Visual SourceSafe 5.0 and Integrated Transact-SQL debugging from Visual Basic 5.0 and Visual C++ 5.0.. Visual Studio 97 comes with a license for one developer. Microsoft Visual Studio 97 Enterprise Edition includes everything within the Professional Edition and adds the ability to scale client/server solutions to the Enterprise with integrated support for SQL, transactions and team development. Microsoft's comprehensive suite of award winning development tools in one economical package. The developer deal of the year.

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MIC685 Microsoft Vis/Studio Ent 97 U/G.....

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MIC736 Microsoft Vis/Studio Pro 97 CD.....

\$1299

MIC682 Microsoft Vis/Studio Pro 97 U/G.....

\$639

Index

Category Page	
Product Listing	2
Introduction	3
SOFTWARE	
Microsoft	4
Hot Deals	5
Business	7
Graphics	19
Utilities	26
PERIPHERALS	
Networking	41
Multimedia	43
Storage	52
Inputs	52
Printers	54
Scanners	57
Modems	59
Miscellaneous	62
Early Learning	59
Leisure	64

Microsoft Visual Basic 5.0

Microsoft Visual Basic 5.0 is a rapid application development (RAD) tool. It's the most efficient tool for creating high-performance applications that run on Windows 95 and Windows NT



Easily create ActiveX controls that can be reused in many different development tools, including Visual Basic, Visual C++, Microsoft Office and Microsoft Internet Explorer. Convert existing applications developed with Microsoft Visual Basic 5.0 to ActiveX Web applications which can be automatically installed and run in an Internet Browser. In addition the Enterprise Edition is for teams of developers building solutions for large organisations. It includes Microsoft SQL Server and tools for fast data access, SQL debugging, distributed transaction processing and team development for database and object oriented analysis.

Microsoft Visual Basic 5.0, with an integrated native code compiler, is the most efficient tool for creating high performance win 32-based applications and components. Build fast Windows based applications more efficiently and quickly than ever before. Create ActiveX controls with little or no codes and create ActiveX Web applications for the Internet and intranet. The fastest way to build high performance Windows applications Visual Basic 5.0 has Native Code Compile, so applications developed in VB will run up to 20m times faster. Has intelligence technology that makes developing in VB even faster and easier. With over 3 million developers, VB is the best selling and most widely used development tool in the world.

BVG028 MS VIS Basic V5 Learning Edition CD.....

\$129

MIC265 MS VIS Basic PRO V5 CD.....

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MIC753 Visual InterDev.....

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In the past licensing agreements for Microsoft software have only been applicable to large organisations. International Software Warehouse now offers Microsoft Open License Packs (MOLP) not only to corporate customers, but also to small and medium sized companies. Today, if you want to install Microsoft Office 97 on 10 machines (or less if maintenance is included), you now qualify for an Open License Agreement. Below we explain in more detail how MOLP works, but for more details call our sales team on 1300 360 799.

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In order to achieve better pricing, the Microsoft Open License has three volume price levels (see table below). It's a simple equation: the higher the initial purchase, the better price band you qualify for. So you not only empower more users, you gain savings that lower your overall costs. And you may reorder (minimum 10) to two years - at the same attractive price level - to meet the evolving IT organisation.

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Price Band C	1,000 units

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For more information on MOLP and how it can save you money call our sales team on 1300 360 799.

MS BackOffice Small Business Server

Microsoft BackOffice Small Business Server is the complete business solution that makes it easy to manage and grow your business.

Microsoft Small Business Server features award-winning products that give you everything you need to run a growing business. Designed for companies with 25 or fewer PCs, it's an integrated solution for sharing files, databases, printers, electronic mail, fax services, applications, and other resources with anyone, anywhere, at any time - all from one integrated server. You get advanced communication services and fast, flexible access to the Internet. Best of all, the server is exceptionally easy to set up, manage, and use, so you can get up and running with it right away.

Microsoft Small Business Server works with the business systems you have now and will work with the technology you'll need in the future. That means you can preserve your current investments while enjoying the advantages of new technologies.

MS Small Business Server works easily with MS Office and other leading applications, so you can integrate information from almost any source into your desktop PCs.

What's more, the server supports applications for MS Windows - the world's most popular software environment - so the latest, best solutions will continue to be available for your business. Software developers have already created more than 2,000 applications and tools that work with Microsoft Small Business Server to meet specific business needs. Microsoft Small Business Server can also help you schedule meetings with employees, customers, and business partners, and assign and manage tasks among team members regardless of their location - all without expensive conference calls. Or you can publish a White Pages directory of names, e-mail addresses, and phone numbers to ease collaboration between employees and business associates.

As your business continues to grow, Microsoft Small Business Server can provide the foundation you need to preserve your computing investments, plus a clear direction for managing your expanding technology needs.

File, print, and application services;

Proven product, secure, reliable, comprehensive platform for connecting to the Internet.

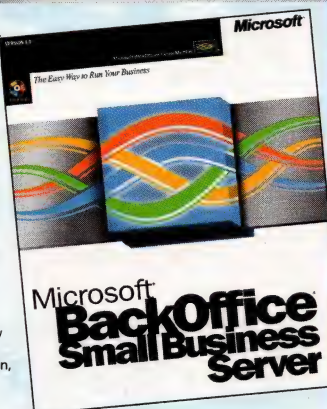
MS SQL Server provides a powerful, secure relational database for running business apps.

Communicate in new, more efficient ways;

Communicate across the world build an online community with electronic mail, discussion groups etc. Centrally manage sending and receiving faxes. Locate a Service Provider & get on the Internet fast! Manage professional-looking Web sites without programming. MS Proxy Server - fast, secure access to the Internet from individual desktop PCs. Share modems from a central location.

Easy to set up, manage, and grow

Installing MS Small Business Server is truly easy. Automated tools walk you through the setup step by step. MS Integrated Server Setup installs all server components; just answer a few questions. MS Setup Computer Wizard; a simple, quick way to add new PCs to your network. Console centralises management tasks in an intuitive location, complete with Wizards.



MS5070 BackOffice SBS 4.0 English Intl C/P Upg. CD 5 Client	\$1,299
MS5071 BackOffice SBS 4.0 English Intl CD 25 Client	\$3,399
MS5072 BackOffice SBS 4.0 English Intl CD 5 Client	\$2,059

Microsoft BackOffice Version 2.5

Microsoft BackOffice provides the integration, ease of use, scalability and manageability hitherto unavailable with traditional client server or Internet software. It provides the best foundation for a new class of solutions that combine the best of three-tier client server and Internet technologies allowing either thick client or thin client solutions to be used as appropriate.

All six members of the BackOffice family work together and share a solidly defined, solidly supported, truly open architecture built around Active X, COM and Windows Open Services Architecture (WOSA).

The Microsoft BackOffice 2.5 includes six integrated "best-of-breed" components that work together to help run your business.

They are:

Microsoft Windows NT Server 4.0

A multipurpose network operating system that is the most powerful, reliable and open platform to build, deploy and manage file and print sharing, client-server and Internet applications for your networks. Windows NT 4.0 includes Internet Information Server - so you have all you need to set up a web server.

Microsoft SQL Server 6.5

SQL Server 6.5 represents the state-of-the-art in relational database management technology, with enhancements including increased performance, heterogeneous replication to ODBC subscribers, distributed transaction control, and Internet connectivity.



Microsoft SNA Server 3.0

Makes it easy to connect PCs to IBM mainframes and As400 systems. Graphical administration tools help you configure and manage that connectivity, giving users convenient, reliable access to host systems, and administrators easier management of new users and devices.



Microsoft Systems management Server 1.2

The most comprehensive solution for managing an entire enterprise-wide system or a 20-node network; an easy way to manage your system that also helps you control administrative costs.



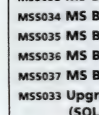
Microsoft Exchange Server 4.0 (with free upgrade to 5.0)

A highly scalable messaging solution integrating e-mail, group scheduling, electronic forms and GroupWare applications.



Proxy Server 1.0

The Microsoft Proxy Server is the easiest and most secure way to bring Internet access to every desktop in an organisation.



MS5031 MS BackOffice	\$3459
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MS5034 MS BackOffice Client License 5 pack	\$1799
MS5035 MS BackOffice Client License 5 pack w/g	\$629
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MS5037 MS BackOffice Client License 20 pack w/g	\$1999
MS5033 Upgrade from any BackOffice Server component (SQL, Exchange, SNA, SMS, NT)	\$2825

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Index

Category	Page
Product Listing	2
Introduction	3
SOFTWARE	
Microsoft	4-7
Hot Deals	8
PCs/Thinkpads	9
Business	10-19
Graphics	20-24
Utilities	25-40
PERIPHERALS	
Networking	41-42
Multimedia	43-49
Storage	50-52
Inputs	52-53
Scanners	54-55
Printers	55-58
Modems	59-61
Specials	62
Leisure	63-64

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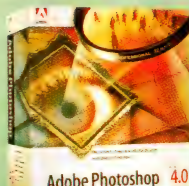


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HWP242 HP ScanJet Transparency (HP 6100C)..... **\$659**

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Aptiva Series from IBM

Aptiva S Series Aptiva L Series

The Aptiva S Series continues to set the standard for the ultimate in home computing with its award winning split system design, superior multimedia, powerful communications and the latest technologies. The S Series introduces 2nd generation of the Split system design which is now easier to use than ever before with the addition of the new EZ Buttons keyboard and ScrollPoint mouse. The S Series comes well equipped for the most demanding PC enthusiasts and gamers with Sound by Bose featuring TrueSpace and Acoustimass technologies, ATI 3D Range Pro graphics w/2x AGP DVD-ROM II drives and 2nd generation Pentium II processors. In addition, the Aptiva S Series includes a complete suite of internet applications features Voice-enable, Netscape Navigator and a total home communications system with KingCentral.



Features:

- Architecture: Mini tower (6x6)/media console (0x2)
- Processor: Pentium II 233MHz
- Memory: Standard / Maximum 32MB/ 384MB
- CD-ROM speed: DVD-2 (Digital Video Disc)
- Disk capacity: 4.2 GB EIDE
- Monitor: 15"
- Graphics type: SVGA (with 3D graphics)
- Video RAM Std/max: 2MB/4MB
- Graphics bus interface: PCI
- Software: Pre-installed is a large selection of useful software, including Lotus SmartSuite
- Warranty: Limited warranty - One year On-site



Features:

- Architecture: Mini tower
- Processor: Pentium with MMX technology 166MHz
- Memory: Standard / Maximum 32MB/ 384MB
- CD-ROM speed: 24x maximum (variable speed)
- Disk capacity: 2.1GB EIDE
- Monitor: 15"
- Graphics type: SVGA (with 3D graphics)
- Video RAM Std/max: 2MB/4MB
- Graphics bus interface: PCI
- Software: Pre-installed is a large selection of useful software, including Lotus SmartSuite
- Warranty: Limited warranty - One year On-site



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The Aptiva L Series has been designed for the family that wants to get the most in education, learning, productivity and fun from a home PC. The L Series comes packed with many of the latest technologies, including a custom-designed Bose audio system and Arcade 3D graphics capabilities that enhance the multimedia learning and entertainment experience.

With its sleek black design, the Aptiva L Series components are styled to integrate seamlessly with one another.

IBM103 Aptiva S Series

\$4349

IBM102 Aptiva L Series

\$2699

IBM ThinkPads

IBM's award-winning ThinkPad family of notebook computers provide the most powerful and convenient way to work anywhere in an interconnected world. IBM is dedicated to delivering the highest quality notebook computers in the industry. Year after year, IBM ThinkPads continue to win praise from around the world and throughout the industry. The competition is moving fast; you've got to move faster. It's time to think about IBM ThinkPad. With eye-catching design, clear, brilliant displays and powerful Pentium processors, IBM ThinkPads provide the ultimate in mobile power, performance and affordability.

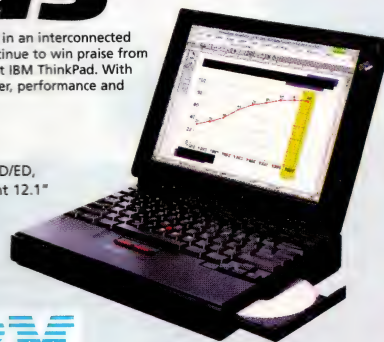
IBM ThinkPad 380ED

All-in-one convenience, versatility and power. The new integrated design offers a diskette, CD-ROM (standard on 380D/ED, optional on 380 and 380E) and hard disk drive in one convenient package. Add a powerful Pentium processor, brilliant 12.1" display and spacious hard drive. With the ThinkPad 380, the power of a desktop meets the personality of a ThinkPad.

Features

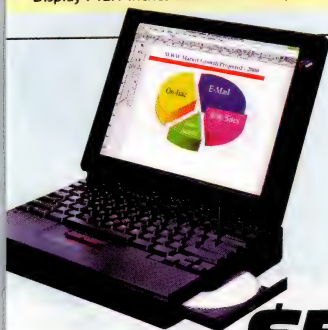
- Model: Model 26355AA
- Processor: Pentium with MMX technology 166MHz
- Memory - standard / maximum: 16MB/80MB
- CD-ROM speed: 8X-20XCD-ROM
- Disk capacity: 2.1GB (S.M.A.R.T. EIDE)
- Multimedia functionality
- Display: 12.1 inches 800x600-FRSTN (fast

- response super twisted nematic)
- Battery Life: Li-ion/20hrs
- Port Replicator connector
- Weight: 3.2Kg Height:62mm Width: 300mm
- Depth: 233mm
- Installed operating system: Microsoft Windows 95
- Includes Microsoft Office 97 Small Business Ed. (Worth over \$500)**



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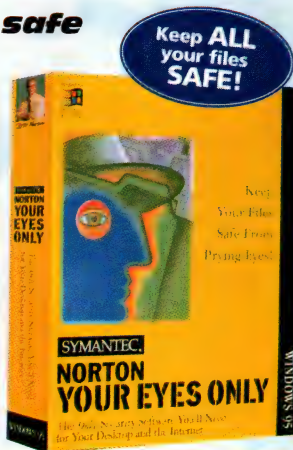
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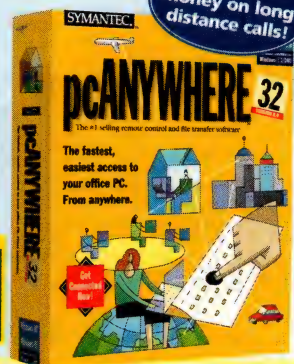
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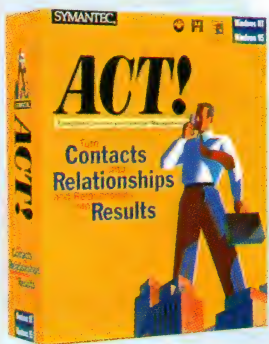
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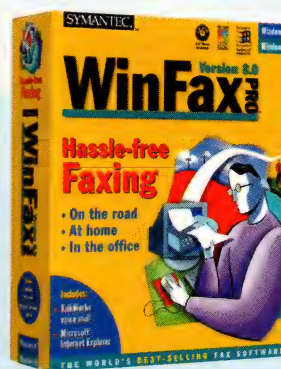
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Microsoft Windows 95

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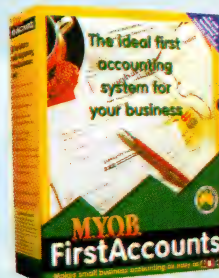
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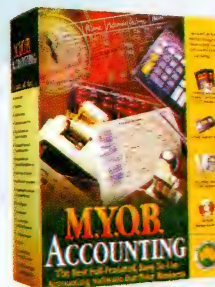
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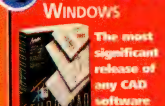
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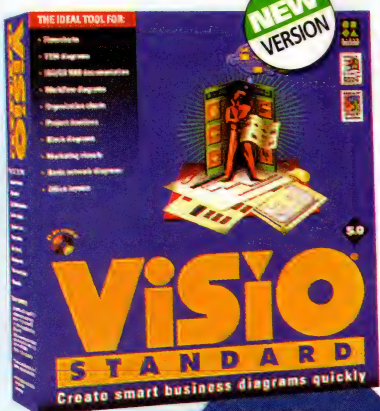
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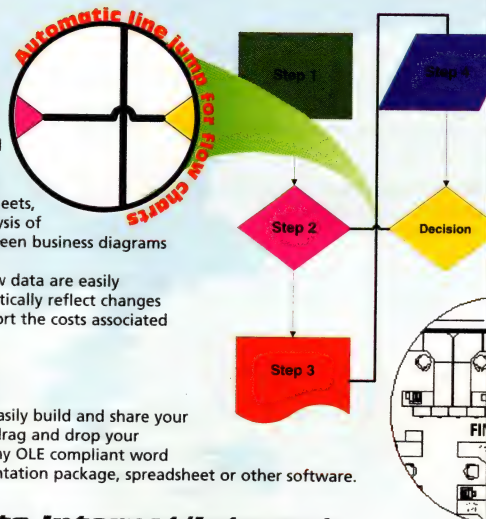


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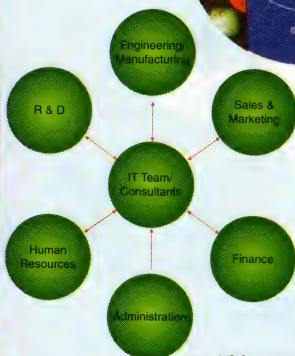


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ID	Task Name	Start Date	End Date	Duration	1 97	2 97
1	Launch Product	19/08/97	19/08/97	1d		
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4	Place Advertisements	1/09/97	1/09/97	1d		
5	Seed Corporate Units	2/09/97	8/09/97	5d		
6	Reseller Training	9/09/97	12/09/97	4d		
7	Internal Staff Launch	15/09/97	15/09/97	1d		
8	Press Release	16/09/97	16/09/97	1d		

Index

Category	Page
Product Listing	2
Introduction	3
SOFTWARE	
Microsoft	4-7
Hot Deals	8
PCs/Thinkpads	9
Business	10-19
Graphics	20-24
Utilities	25-40
PERIPHERALS	
Networking	41-42
Multimedia	43-49
Storage	50-52
Inputs	52-53
Scanners	54-55
Printers	55-58
Modems	59-61
Specials	62
Leisure	63-64

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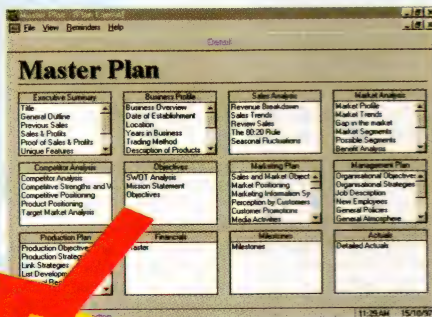
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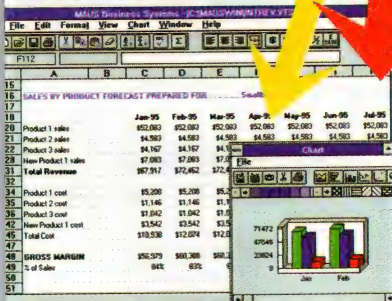
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Index

Category Page
Product Listing 2
Introduction 3

SOFTWARE

Microsoft 4-7
Hot Deals 8
PCs/Thinkpads 9
Business 10-19
Graphics 20-24
Utilities 25-40

PERIPHERALS

Networking 41-42
Multimedia 43-49
Storage 50-52
Inputs 52-53
Scanners 54-55
Printers 55-58
Modems 59-61
Specials 62
Leisure 63-64

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14

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Business Planner

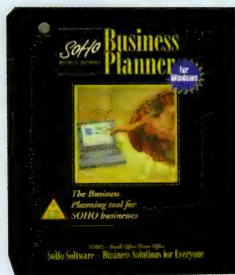
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Businesses don't plan to fail they fail to plan

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Designed for
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Easy to use
Window driven to step you easily through the business planning process
All selection headings have their in-line help and Section Templates with all the sentences you need to create comprehensive business plans
Copy the sentences you need from the Templates, change to meet your business requirements, print your plan and you are in business.
A fully integrated word processor and spreadsheet

- facility is provided
- Additional facilities include: the ability to have multiple plans open, the ability to import and export text, documents, spreadsheets and graphs
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- Runs on all versions of Windows
- Developed and produced in Australia especially for SOHO businesses

Business Planner helped us create our winning Business Plan
KSA and Associates

Marketing and Sales Planner helped us plan our marketing strategy
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01001 Business Planner

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SOH003 Business Writer

Business Writer

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- Documents are stored in an on-line data base and can be retrieved into business planners own word processor or your own
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- ISO 9001 / ISO 9002

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Q.A. is simply good business practice. Most companies and organisations will already have some elements in place Qudos - TQA allows you to incorporate existing documents into your Q.A. system. Many systems based on Qudos-TQA are in use throughout the world and have helped a wide spectrum of users to achieve lasting benefits, external certification, and industry awards.

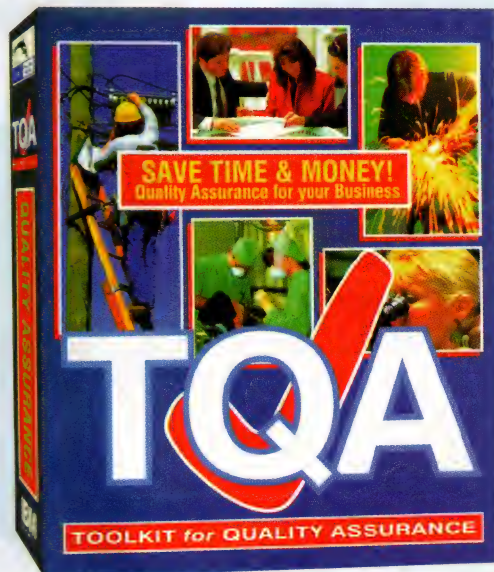
FEATURES

- ✓ Low price - only a fraction of typical consultant fees!
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TQA001 TQA



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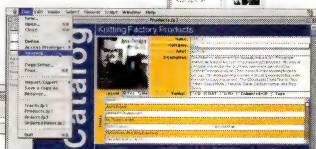
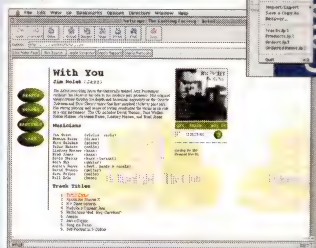
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Clariss FileMaker Pro

FilemakerPro allows you to Create and Share relational databases On The internet

New Filemaker Pro 4.0 is a comprehensive data management program powerful enough to organise and use all of your information on your desktop, across your network and over the World Wide Web. Using built-in HTTP functionality, you can instantly make company directories, course listings and other Filemaker Pro databases viewable with ordinary Web browsers: so you don't need to have a Web server or write HTML code. Authorised users can even edit, delete and update records, and with Filemaker Pro 4.0's built in CGI tools and compatibility with Claris Home Page 3.0 software, it's easy to tie interactive databases to your Web page.



Easy information management—from desktop to the web

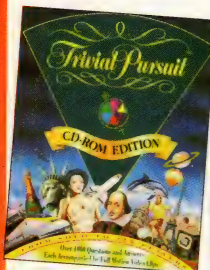
- Instant web publishing
- First connection of Microsoft Excel spreadsheets
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Powerful relational database software

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Index

Category	Page
Product Listing	2
Introduction	3
SOFTWARE	
Microsoft	4-7
Hot Deals	8
PCs/Thinkpads	9
Business	10-19
Graphics	20-24
Utilities	25-40
PERIPHERALS	
Networking	41-42
Multimedia	43-49
Storage	50-52
Inputs	52-53
Scanners	54-55
Printers	55-58
Modems	59-61
Specials	62
Leisure	63-64

ClarissWorks Office 5.0

The smartest all-in-one software for business, education and home!

All the Office You Need

ClarissWorks Office Software is the office productivity program that speeds you through every business task. ClarissWorks Office 5.0 the all-in-one program which integrates word processing, graphics, spreadsheet and database into one powerful yet simple-to-use program. ClarissWorks Office is also your on ramp to the internet and comes with web page design tools. So you can surf the net, exchange email and create web pages for your business in no time. This program lets you take control of your entire office - guiding you step-by-step through creating news letters, mailing labels and more; linking to URL's from within your documents and launching other applications- all from its handy Button Bar. It all adds up to a powerful set of productivity tools for your business.

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Whatever you need to do to succeed in business and education it's easier to do with ClarissWorks Office! With 175 customisable documents to use, the ability to launch other applications, and easy Internet access you will wonder how you managed before you had this integrated program.

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- The ExpressStyle feature redefines the stylesheet metaphor, enabling users to instantly format not only text and paragraphs, but also graphics, outlines and tables.
- FastReport automates searching, sorting, and reporting of frequently used data
- ReadyArt Libraries allow users to store and organise frequently-used clipart images (500 images are included).
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All the Office you need!



ClarissWorks OFFICE



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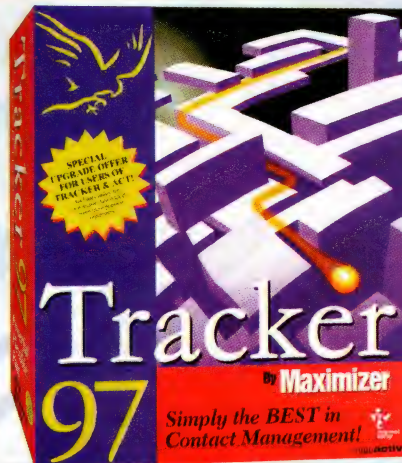


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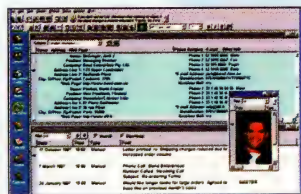


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Stop Juggling Software!

You can do everything from Tracker! Create your own macros and toolbars to launch your most commonly used functions and software programs. DDE and OLE support lets you link your customer records to spreadsheets, documents, graphs, photos or multi-media files in other applications.

Networkable for your Whole Sales Group

Tracker is the ideal tool for sales force automation. It's networkable right out of the box, with group scheduling, communications and other features that turn your sales force into a lean, mean selling machine.

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Now you never have to leave your Tracker Desktop. And, if it recognises the sender's address, Tracker automatically attaches the messages to that sender's file in the address book! No more searching through poorly organised email filing cabinets.

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Designed for
Microsoft
Windows 95

Stock Code TRA021

\$259

Call for licence pricing

Borland JBuilder



JBuilder delivers 100% Java code creation in a fully scalable, extensible and reliable environment

With its 100% pure Java code creation, JBuilder's most productive visual development environment will give your company a competitive edge. JBuilder provides what your business requires most: scalability, extensibility, and reliability.

JBuilder's best database integrates and support allows the creation of professional business applications that scales from the desktop all the way to the Enterprise.

JBuilder's open architecture based on JavaBeans delivers an unmatched extensibility that lets you create, use and reuse JavaBean components. By supporting industry standards, JBuilder lets you create applications that won't confine you to a proprietary standard. In addition, JBuilder provides a reliable environment based on the latest JDK 1.1, a solid architecture, and a well-proven compiler technology.



Stock Code BOR170

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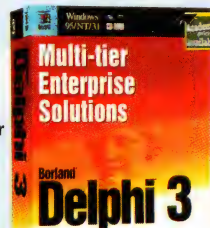
Features

- Component Designer lets you visually design Java components or applications
- Large library of reusable BAJA/Java Bean components
- Supports 3rd party and user defined components
- Two-way tools keep visual design and source code in sync
- AppBrowser provides fast navigation and management of source code.

Borland Delphi 3.0

Delphi 3.0 the high performance RAD tool for windows and C/S development.

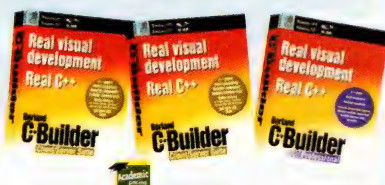
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Office suites have changed substantially since the category in the late 1980s. From loose collections of applications, such as spreadsheets, word processors and databases, suites have evolved to offer consistency among applications, cross-application integration, and streamlined access to applications, files and tools. SmartSuite 97 delivers specialised tools for finding, publishing and sharing Internet information. It also features Team Computing which defined the standard for desktop based collaborative tools. SmartSuite 97 delivers advanced workflow, cross applications automation, and more aggressive exploitations infrastructures with full 32-bit applications which exploit the operating environment.

With SmartSuite 97 you have tools to find and retrieve all the information you need. Users need to personalise their applications and much of SmartSuite is configurable to suit your individual needs.

The suite that brings the world to your desktop!

SmartSuite 97

- Lotus 1-2-3 97 is a completely redesigned, 32-bit spreadsheet that delivers a host of new and enhanced capabilities to automate everyday tasks and simplify processes.
- Lotus Word Pro 97 provides users all the tools they need to quickly and easily create powerful, compelling, great-looking documents.
- Lotus Approach 97 leads the database world in delivering an unparalleled combination of ease-of-use and power.
- Lotus Freelance Graphics 97 continues its long tradition of simplifying the creation and delivery of highly effective presentations.
- Lotus Organizer 97, the award-winning personal time management system, is now a complete 32-bit product with support for Windows 95 and Windows NT.
- Lotus ScreenCam 97 is a fast, easy way for users to show what they mean when they can't be there in person. With ScreenCam, a PC acts as a VCR to record every on-screen click, scroll, and action. Captions and sound can be added to create mini-movies, delivering marketing messages, on-line tutorials, or product demonstrations. These on-line movies can be shared with anyone, even if they do not have ScreenCam installed. ScreenCam is a completely redesigned, 32-bit application.
- Lotus SmartCenter 97, the Suite's customisable command centre, keeps users organised and gives them ready access to their work-in progress, calendar and address book, and even the Internet. Just a click away, SmartCenter's drawers provide a central place for users to get the latest news and weather, organise the day's work, find reference material, or write themselves a reminder. New drawers in SmartCenter 97 give users fast automatic links to the Internet to search for information and favourite bookmarks, and get just-in-time help from Lotus Support Pages on the Web.

Every application in the suite includes a host of innovations and improvements designed to help users:

- Increase their individual productivity
- Access data from anywhere
- Leverage the power of the Internet and Intranets
- Share and collaborate more efficiently



Lotus

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Index

Category	Page
Product Listing	2
Introduction	3
SOFTWARE	
Microsoft	4-7
Hot Deals	8
PCs/Thinkpads	9
Business	10-19
Graphics	20-24
Utilities	25-40
PERIPHERALS	
Networking	41-42
Multimedia	43-49
Storage	50-52
Inputs	52-53
Scanners	54-55
Printers	55-58
Modems	59-61
Specials	62
Leisure	63-64

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Reach Any PC, From Everywhere, Every Way

Away from your office, but need remote access to files, data, or application from your PC? It's easy with the award winning ReachOut 7.0 from Stac. ReachOut is the only all-in-one box solution to provide remote access from, and to virtually any PC running Windows NT, Windows 95, Windows 3.1, or DOS.

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18

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- Unneeded fonts
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- Forgotten backup files
- Nonessential art and multimedia files
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- & tones of other random useless garbage that you don't even know is hogging your hard drive and crippling your PC's performance.

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IMS051 WinDelete 97

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NetAccelerator speeds you Internet Explorer or Netscape web browsing by using the idle time of your modem, intelligently load web pages in the background. Whenever you pause to view a site, NetAccelerator stays busy behind the scenes seeking out available links and downloading related graphics and text. When you choose a link, pictures and text appear instantly! Users will benefit by having faster access to web pages without any special hardware. NetAccelerator works with standard modems, ISDN and direct network connections.

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AUS160 Home Collection

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NEW PRODUCT

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The Only Complete Uninstaller

INCLUDES
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WinDelete 97

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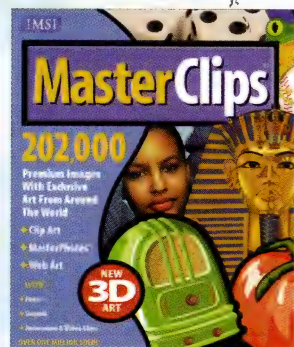
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Vector Images	87,7000	54,000	54,000	33,000
Dover	47,000	47,000	0	0
MasterPhotos	50,300	47,000	19,000	12,000
Web Art	18,100	1,400	0	0
MasterPhotos Objects	400	0	0	0
MasterFonts	2,000	2,000	2,000	2,000
Sounds	500	500	500	500
Video & Animations	20	20	20	20
Browser	Yes	Yes	Yes	Yes
Editor	Yes	Yes	Yes	Yes
3D Art	Yes			
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Index

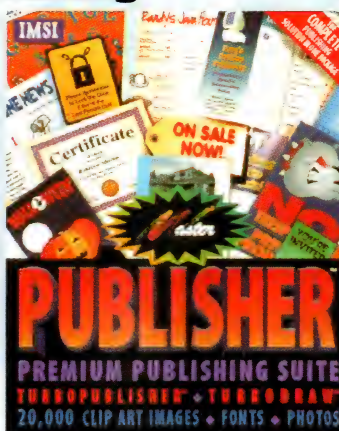
Category	Page
Product Listing	2
Introduction	3
SOFTWARE	
Microsoft	4-7
Hot Deals	8
PCs/Thinkpads	9
Business	10-19
Graphics	20-24
Utilities	25-40
PERIPHERALS	
Networking	41-42
Multimedia	43-49
Storage	50-52
Inputs	52-53
Scanners	54-55
Printers	55-58
Modems	59-61
Specials	62
Leisure	63-64



MasterPublisher HiJaak PRO V4

Powerful, Professional Desktop Publishing - Made Easy

MasterPublisher 97 includes six complete products and is THE premium desktop Publishing Suite! Create custom publications for you and your business using the only design package of it's kind. With more powerful tools and valuable content MasterPublisher 97 lets you create custom, high-quality newsletter, brochures, logos, presentations and much more! MasterPublisher 97 Premium Publishing Suite gives you everything you need to be a Master Publisher in one package! TurboPublisher lets you lay out and design professional looking documents. TurboDraw, a full featured drawing and illustration program, helps you create impressive graphics quickly and easily. Also included in Master Publisher are 20,000 Premium MasterClips images, 1,000 stunning MasterPhotos, 2,000 MasterFonts and the powerful browser lets you use keywords and the unique cross-category search engine to instantly find the images you need. Master Publisher Premium Publishing Suite is perfect for newsletters, brochures, greeting cards, signs, presentations, the Internet, school projects, desktop publishing and much more!



\$79.95

AUS160 MasterPublisher

HiJaak PRO is the most comprehensive 32-bit toolkit available for the graphics professional.

Whatever your graphic needs, this powerful set of tools helps you to do your job better and faster. HiJaak PRO converts 85+ formats - including 3D and full postscript allowing you to view and alter images without the original application.

Supported formats include popular raster, vector, metafile and 3D formats.

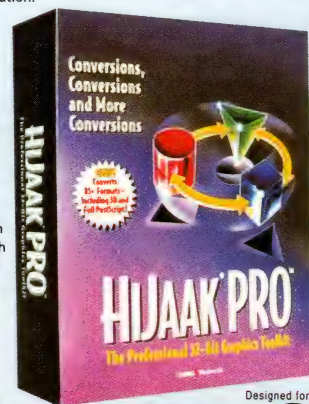
HiJaak PRO gives you all the tools you need to help you do your job more efficiently.

View Images

HiJaak PRO is a powerful program that lets you view, convert, capture, enhance, find and organise images. View over 85 formats without needing the original application. View multiple images in HiJaak PRO's main window. Also create and view extra large thumbnails of images (both 2D and 3D) from within the Windows 95 Explorer. Then launch HiJaak PRO right from the shortcut menu of the file to get the full view. Even view full PostScript Level 2 Files to confirm accuracy before sending them to your service bureau.

Enhance Images

Make adjustments to images easily! There is no need to start another editor to resize, flip, crop, rotate, smooth or grayscale or black & white images out of colour images. Reduce colours using diffuse, snap or halftone. HiJaak PRO also converts raster to vector and prints images and thumbnails.



\$139.95

IMS050 HiJaak PRO V4

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GRAPHICS

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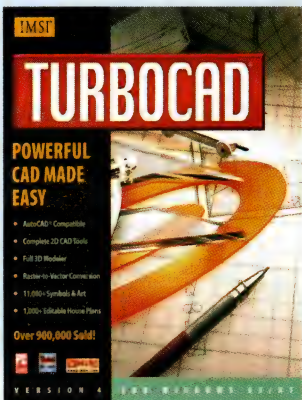
TurboCAD v4!

TurboCAD V4 continues to be the leading value in desktop CAD for the CAD hobbyist, home user or occasional professional user.

TurboCAD V4 offers a powerful solution for the easy creation, refining and communication of graphical ideas through drafting and design techniques. Built on an award-winning history, TurboCAD V4 delivers all the power and precision professionals need with simplicity. TurboCAD V4 is built around ease-of-use without compromising CAD functionality. The intuitive interface allows users to produce professional quality designs and diagrams in minimal time.

TurboCAD V4 offers a powerful solution for the easy creation, refining and communication of graphical ideas through drafting and design techniques. Built on award-winning success, TurboCAD V4 is built around ease of use without compromising CAD functionality or quality. The intuitive interface allows users to produce professional quality designs and diagrams in minimal time.

These features, combined with advanced tools such as handle based editing, drag and drop symbols, single entry keyboard shortcuts, and raster to vector capability to make TurboCAD V4 the perfect CAD solution in its price range.



IMS034 TurboCAD v4 **\$189**

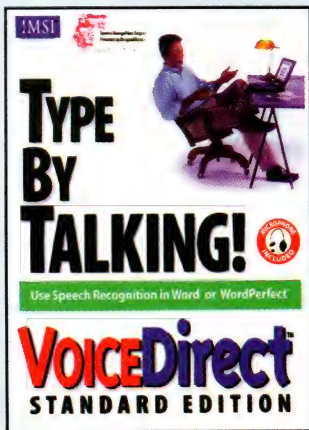
TUR012 TurboCAD v4 Professional **\$499**

VoiceDirect Standard Edition



Discrete speech recognition software with microphone for use with Word & WordPerfect

VoiceDirect Standard edition is discrete speech recognition software powered by Dragon Dictate for people who want to write, type and edit reports by voice instead of typing. dictate directly into Word or WordPerfect by speaking and your computer will carry out your commands, displaying your words on the screen directly in your application. VoiceDirect Standard Edition includes a 120,000 word total vocabulary, which maximises accuracy and minimises time at the keyboard. just open Word or WordPerfect, create detailed reports and get back to work in no time. VoiceDirect Standard Edition is perfect for busy executives with better things to do, than type!



IMS110 VoiceDirect Standard Edition **\$79⁹⁵**

FloorPlan 3D Deluxe



Design your complete home, office or garden quickly and easily with FloorPlan 3D Deluxe.

Its full set of precision drawing tools help you create custom walls, floors, doors and window. Complete your design by using thousands of symbols, then walk through it in accurate 3D. FloorPlan 3D Deluxe also gives you TurboCAD 3D to create accurate 3D models, Garden Designer, and complete garden layout and planning guide, Quick & Easy Estimator to get an accurate estimate of your project plus 1500 home and office symbols and 1,001 Home Plans from Homestyles. FloorPlan 3D Deluxe is the premium home and office design suite.

Also includes:

- Quick & Easy Estimator - import your materials list for a cost estimate
- Garden Designer- design your dream garden
- 1,001 best-selling HomeStyle FloorPlans

Features:

- Design your dream home and office in minutes
- Includes a complete set of design tools
- Over 1500 3D symbols including home and office furniture, applications etc
- 3D Modeler and Symbol Editor lets you create custom symbols and rendered 3D models



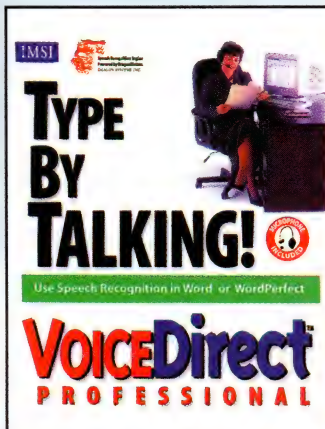
THR009 FloorPlan 3D Deluxe **\$89**

VoiceDirect Professional Edition



Discrete speech recognition software with microphone for use with Word, Excel, WordPerfect, PowerPoint & Internet Explorer

VoiceDirect Professional is discrete speech recognition software powered by Dragon Dictate that lets you create, format and move text by voice within virtually any windows application. You can even operate your PC entirely hands free, as you dictate directly into Word, WordPerfect, Excel, Powerpoint, Internet explorer and more. A 120,000 total word vocabulary is included to help you maximise accuracy and minimise time spent at the keyboard. VoiceDirect Professional is perfect for anyone who wants to dictate and edit while referring to notes or documents. Free yourself to be more productive using the PC technology of the future - TODAY!



IMS111 VoiceDirect Professional Edition **\$129**

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Index

Category	Page
Product Listing	2
Introduction	3
SOFTWARE	
Microsoft	4-7
Hot Deals	8
PCs/Thinkpads	9
Business	10-19
Graphics	20-24
Utilities	25-40
PERIPHERALS	
Networking	41-42
Multimedia	43-49
Storage	50-52
Inputs	52-53
Scanners	54-55
Printers	55-58
Modems	59-61
Specials	62
Leisure	63-64



QuarkXPress 3.32 For Windows

The professionals choice for publishing software worldwide

Soon after QuarkXPress was introduced, it became the standard for excellence in professional publishing. It offered new flexibility and un-heard of precision. Today, QuarkXPress remains the layout and design choice of the world's top publishers. In fact, most of the magazines and newspapers you are familiar with are created with QuarkXPress (this one is). When you need to create business cards, annual reports, full colour brochures, magazines, or catalogue, your publications will benefit from the precision, power, and flexibility of QuarkXPress.

The power of QuarkXPress is harnessed by a simple, intuitive, and elegant interface. Behind the interface is one of the most powerful publishing programs available. Seven floating palettes work together to give you quick access to the sophisticated colour, tools, measurements, document layout, and library controls that have made QuarkXPress the industry standard.

QuarkXPress offers the most sophisticated features available in any electronic publishing program. The included Efi-Color XTension ensures that the colour you see on the monitor matches the colour the colour you get off the press. Built-in trapping controls ensure that colours on the page fit together. With variable-shaped text boxes, automatic drop caps, colour blends, and the ability to flip and scale page elements, you have unlimited possibilities for page design - and the powers to realise those possibilities.



QUA003 QuarkXPress 3.32 for Windows	\$1669
QUA095 QuarkXPress 3.32 MAC/PowerMac	\$1949

Kai's Power Goo

Get Totally Warped with Goo Effects

With this Variety of tools you can GOO absolutely anything you want. Maybe the image of a friend or a member of your family, a famous politician even the family pet can't escape the effects of GOO. Watch on screen as you smudge and alter their image with the revolutionary tool palette that is so easy to use. Use fusion to blend pictures together. Combine the eyes of one image with the face of another.

"Prepare to be Gooed!!!"



KAI003 Kai's Power Goo (Win) ...	\$94⁹⁵
KAI003 Kai's Power Goo (Mac) ...	\$94⁹⁵

Photo Soap

Clean up your image

It's a photo fact! You have to work with lousy photos now and then. So, make sure you've got Soap inside your computer. It fixes bad photos - better than anything else. Change and correct colours, fix "red eye" or remove wrinkles and scratches - all with the whisk of a brush. Crop, rotate, revise and close in real time. Yes, Kai's Photo Soap is a great way to clean up your image.



KAI015 Photo Soap (Win/Mac)

\$95

Convolver

Manipulation Control

One of the best manipulation tools for Photoshop! KPT Convolver is the first program to unlock the incredible power of the Custom Convolution Kernel, that area of imaging mathematics that provides the empirical structures which generate well known effects like Blur, Sharpen, Emboss, Edge detection, Unsharp Masking and more, within a single advanced user interface designed by Kai.



AUS106 Convolver 1 (Win)	\$185
AUS402 Convolver (Mac)	\$185
KAI012 Vector Effects (Mac)	\$185

KPT Convolver

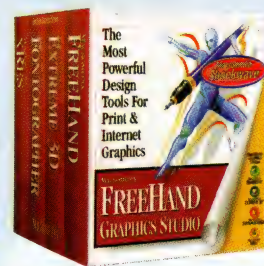
Freehand Graphics Studio

The Most Powerful Design Tools for Print & Internet Graphics

For Windows 95, Windows NT, Macintosh, and Power Macintosh

Move beyond the boundaries of print - take your designs to the digital edge of the Web with the FreeHand Graphics Studio and Macromedia Shockwave. This Studio contains everything you need for stunning graphics in any dimension. Bring the most powerful graphics software together in a single package.

Work seamlessly between all the tools in the Studio and with all your favourite applications.



- **Freehand 7.0** The professional graphics tool for the Macintosh is now available for Windows. Long established as the tool of choice on the Mac, this latest version brings new levels of power, creative control and flexibility to professional graphic designers
- **XRes 3.0** a complete suite of hi-res image manipulation tools recently upgraded it now has "full internet streaming" support
- **Extreme 3D** The easiest and quickest way to move from 2D to 3D graphics with all the power the professional requires, now includes particle animation and meta forms for creating organic shapes and models
- **Fontographer 4.1** Gives you the tools to scan, edit or create your own fonts

MAC017 Freehand Graphics Studio 7 single user (Win)	\$695
MAC027 Freehand Graphics Studio 7 single (MAC/PowerMac)	\$695
MAC038 Freehand Graphics Studio 7 Education single user (Win)	\$459
MAC0041 Freehand Graphics Studio 7 Education single user (Mac)....	\$459

Freehand 7.0

FreeHand 7 has the fastest, most comprehensive set of design tools available for creating dynamic graphics and page design in print and on the Web.

Graphics creation and effects tools:

Create spectacular special effect with a complete, vector-based design environment and unparalleled support for bitmap formats, third-party effects filters, vector-based effects Xtras and FreeHand's own powerful effects tools.



MAC029 Freehand Retail (Mac)	\$599
MAC042 Freehand Retail (Win)	\$599
MAC043 Freehand Education (Mac)	\$189
MAC044 Freehand Education (Win)	\$189

Bryce 2 Accessory Kit

Stunning Scenes in Seconds

Do you like Bryce? If so, you'll love the Bryce 2 Accessory Kit. Want to be able to access more textures without making them yourself? Want to have a greater choice of terrains and models? Want a sky setting that's just perfect for this job without tweaking for hours in the Sky & Fog controls? Then you'll want the Bryce 2 Accessory Kit - it's packed with modes, terrains, textures and presets - the Bryce 2 Accessory Kit gives you the ability to quickly create stunning Bryce scenes in minutes.



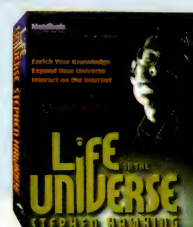
AUS401 Bryce 2 Accessory (Win)	\$89
AUS105 Bryce 2 (PC)	\$269

Life In the Universe

Stephen Hawking

What is life? How did it start? Could it exist on other worlds? Join Stephen Hawking, author of 'A Brief History of Time', on an interactive multimedia adventure that explores "life in the Universe".

The eminent cosmologist and, Professor Stephen Hawking's new CD will show you! His animated "Phage" assistant points the way across virtual 3D terrains, teeming with original animation, through-provoking essays and science games.



KAI011 Life in the Universe

\$75

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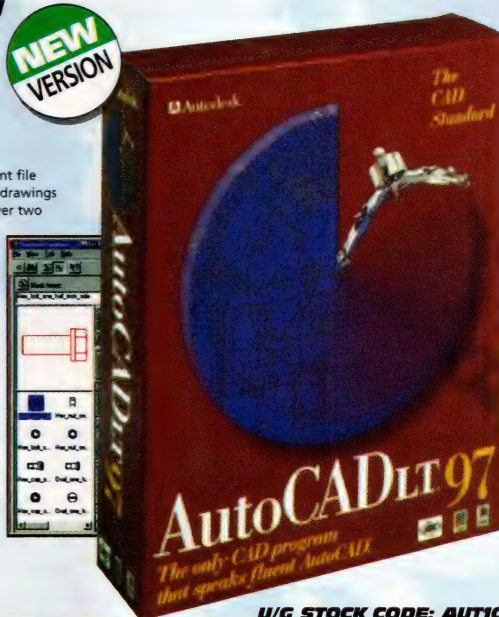
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AutoCAD LT 97

The only CAD program that speaks Fluent AutoCAD

NEW VERSION



No matter how much time you spend creating a design, it's wasted if your co-workers can't understand the ideas you want to convey. Now introducing AutoCAD LT 97 which is the only low-cost, professional 2D CAD application that has 100 percent file compatibility with AutoCAD, the world's best selling design and drafting software. Whether creating your own drawings or simply need access to CAD documents, AutoCAD LT 97 software gives you instant access to files created by over two million AutoCAD and AutoCAD LT users world wide. Perfect for designers or projects that do not require full-blown AutoCAD capabilities. AutoCAD LT 97 works as a drafting tool for preliminary sketches, detail drawings or final designs. And now it's even easier with our new Content Explorer - for dragging and dropping existing images and icons - in addition to complete Internet tools.

Easy to learn, Easy to Use
Within a short time of using AutoCAD LT 97 you will discover the power and capabilities you'd expect to pay thousands of dollars for. AutoCAD LT 97 looks and feels like software you are already comfortable using. You'll quickly become accustomed to the new zoom and pan features of the Microsoft IntelliMouse along with the right-click shortcut menu.

Familiar Interface
It is fully compatible with Windows 95 and Windows NT 4.0 and has built-in Microsoft Office 97 capabilities.

Faster publishing
With AutoCAD LT 97's new Content Explorer software, you can annotate your drawings, quickly and easily, which lets you drag and drop commonly used blocks and drawing from the hundreds of full-scale, industry-standard symbols included in the box, or from your company's internal libraries.

Smarter Tools
AutoCAD LT 97 provides new tools to help you get your job done. AutoSnap automatically locates geometric points during drawing and editing, then signals their location. PolarSnap snaps your cursor to incremental angles and distances when you are drawing or editing objects, so you don't have to enter these details at the command prompt.

Greater Productivity
AutoCAD LT 97 offers dozens of productivity improvements over the last release, including Print Preview, ADI plotter support, and network printing.

Effective Training and Help
The AutoCAD LT 97 learning assistance interactive CD-ROM provides more than 50 lessons you can work through at your own pace. And AutoCAD LT 97's Help system makes finding the information you need as easy as using a Web browser.



U/G STOCK CODE: AUT101

\$369

\$799

AUT100 AutoCADLT97

Adobe Illustrator Version 7.0

Simply the finest illustration software



Award Winning

The award-winning Adobe Illustrator 7.0 simplifies the task of creating, manipulating, and refining artwork whether you're a desktop publisher, graphic artist, or online designer. Enjoy greater productivity with version 7.0's seamless integration with Adobe Photoshop and Adobe PageMaker programs, streamlined interface, speedy handling of large images, RGB colour support, precision, control of type, supports Japanese fonts and more.

Compatibility: Seamless integration with the Adobe product family makes it easy to realise any concept. Or take advantage of new RGB colour support, and add your artwork to video. The new Web publishing features makes it easy to publish Adobe Illustrator artwork on the Web. Complete compatibility between the Macintosh and Windows 95 and Windows NT 4.0 platforms means that you can do your best work on the platform of your choice, and then freely move files between systems.

Enhanced colour management: Version 7.0 included ColorSync support for Macintosh and Kodak Digital Science CMC for Windows. Plus color separation support is built-in, for the impeccable quality you demand.

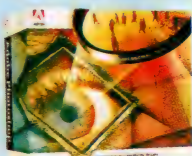
Match your imagination: Use multiple layers to overlay graphics and text, and freely add, remove, view, and hide any element. Choose from almost 50 special effects filter for distortions or nine art effects. Use improved sophisticated typographic tools and controls in Version 7.0 with convenient palettes, new vertical text tools.



ADO047 Adobe Illustrator 7.0 (Win) **\$729**
ADO054 Adobe Illustrator 7.0 U/G (Win) **\$229**
ADO061 Adobe Illustrator 7.0 U/G (Mac) **\$209**



ADO031 Adobe PageMaker 6.5 (Win) **\$979**
ADO032 Adobe PageMaker 5.0 U/G (Win) **\$199**



ADO030 Adobe Photoshop 4.0 **\$979**
ADO033 Adobe Photoshop 4.0 U/G **\$299**

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Open and work with files smoothly and easily. Adjust master pages and share files to keep projects on the move

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A camera for your mind
Create original artwork, correct colour, retouch images and prepare professional quality separations and electronic output with more flexibility than ever before.



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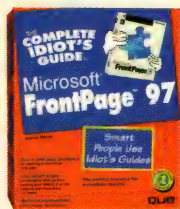
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Index

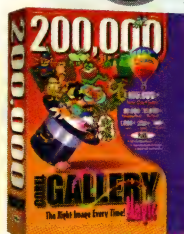
Category	Page
Product Listing	2
Introduction	3
SOFTWARE	
Microsoft	4-7
Hot Deals	8
PCs/Thinkpads	9
Business	10-19
Graphics	20-24
Utilities	25-40
PERIPHERALS	
Networking	41-42
Multimedia	43-49
Storage	50-52
Inputs	52-53
Scanners	54-55
Printers	55-58
Modems	59-61
Specials	62
Leisure	63-64

Corel GALLERY Magic 200,000

Make every project special with Corel GALLERY Magic 200,000, a collection of 200,000 images, including 105,000 clipart images, 80,000 photos and hundreds of fonts, animated .GIFs, sounds, video clips and theme sets for the Web. Packed with a full-colour clipart manual, powerful visual file manager and more, Corel GALLERY Magic makes it easy to stay organised. Search multiple libraries with the wizard-style search interface to find the image you need, then drag and drop it into most applications. Preview thumbnails and manipulate bitmap images using the Image Editor.

Features

- Over 105,000 vector clipart images (includes 55,000 images new to this product plus 50,000 images from Corel MEGA-GALLERY)
- 80,000 low-resolution Internet-ready, royalty-free professional photos
- 15,000 Web images, including theme sets and animated gifs
- Powerful multimedia file manager and the Corel Photo Browser Database



NEW PRODUCT

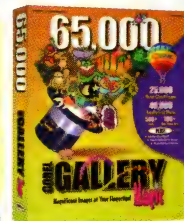
COR400 Corel GALLERY Magic 200,000 **\$115**

Corel GALLERY Magic 65,000

Offering 25,000 vector images, 40,000 photos, 500 fonts, 100 animated .GIFs and 100 theme sets for the Web, Corel GALLERY Magic 65,000 is an ideal choice for all your desktop, multimedia and Internet publishing needs. Enhance brochures, newsletters, presentations, school projects, videos, greeting cards, posters and more. Find images quickly and easily, and simply drag and drop them into your document. A state-of-the-art multimedia file manager helps you manage projects efficiently by organising your files into convenient thumbnail albums. Use built-in mini-editors to edit your favourite clipart image or photo. Corel GALLERY Magic 65,000-magnificent images at your fingertips!

Features

- Over 25,000 clipart images
- 40,000 royalty-free professional photos
- Full-colour clipart manual - also show fonts (photo thumbnails not included)
- Over 500 True Type and Type 1 fonts
- 100 theme sets for the web
- 100 animated gifs



NEW PRODUCT

COR401 Corel GALLERY Magic 65,000 **\$49**

Corel Print House Magic, Version 3

Create dazzling greeting cards, banners, invitations, business cards, flyers and more in a flash. Use thousands of fully customisable samples or create your own designs with the assistance of wizards and advanced drawing tools. Touch up or alter your favourite photographs using Corel Photo House 2 and keep track of addresses and special events with Corel Family & Friends. Let context-sensitive help make complex tasks, such as double-sided printing, a breeze. Browse through full screen previews of each project before selecting one-no more squinting at small thumbnail images. Corel Print House Magic-the all-in-one graphics package that lets you express yourself!

Corel Print House 3

- Thousands of fully customisable samples
- Fully editable graphics
- Text-merging capability for labels and mailings
- Advanced drawing tools-a subset of the tools found in CorelDRAW 7
- Extensive import/export capabilities
- Support for specialty papers such as PaperDirect
- Double-sided printing
- Multimedia introduction

Corel Family & Friends

- Calendar of shows, holidays, birthdays, anniversaries and user-defined events
- Reminders that ensure special events are not forgotten so cards can be sent out on time
- Simple and easy-to-use address book. Addresses can then be inserted into a Corel Print House 3 project for mass mailings
- Keeps track of CD collections, recipes, etc.
- Complete address book and list manager
- Ability to set reminders for upcoming holidays and special events

New to Print House Magic

- Expanded project capabilities including online greetings and photo projects
- Address book and daily event reminder
- Spell-as-you-go capability
- Context sensitive property bar
- Image Sprayer



NEW PRODUCT

- Symbol Sprayer
- Drag and drop Photographic objects and frames
- 25 New brush presets
- Photo House text tool
- Expandable special effects
- Support for pressure sensitive tablets

COR402 Corel Print House Magic, Version 3 **\$79**

Eureka's 115,000 Images

Perfect for Graphic Designers, Desktop Publishers and Web page designers.

A superior collection of images, fonts and sounds compiled by graphic artists who were disappointed with what was currently available. The Special browser included enables rapid scanning of 24 objects at a time and a refreshing of these objects with a "mouse" click. Excellent value as the browser is itself worth the price of the package

An outstanding 6CD set containing the following:

- 36,000 fully scalable vector images
- 4,000 True Type fonts
- 2,000 EPS fonts
- 12,000 Icons
- 36,600 Photos
- 8,600 Animated Gifs
- 480 Backgrounds
- 1,300 Raytraced Images
- 10,000 Tif images
- 5,500 Music and Sound effects

U/G STOCK CODE: NOD002

\$59.95

\$59.95

Also available

NOD003 Eureka's 35,000 images with browser **\$59.95**

NEW PRODUCT



Graphics Explosion

The absolute best value software buy of the year!

One of the world's most powerful desktop publishers has been added to the Eureka's 115,000 Images to create the ultimate desktop publishing program. It also has the unique browser which has removed the need for a separate clip art catalogue. This value packed edition comes with 8 CD's.

Contains Eureka's 115,000 images plus Corel Draw5 and Corel All movie Guide

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- Corel MOSAIC™
- Corel PHOTOPAINT™
- Corel QUERY™
- Corel CHART™
- Corel DRAW™
- Corel SHOW™
- Corel MOVE™
- Corel TRACE™

Corel Draw5 includes: Corel All-Movie guide which is a data base and reference guide for over 90,000 movies and videos.

Includes 8 CDs

NOD004 Graphics Explosion 2 - Premium Edition **\$89.95**

\$89.95

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HOT UTILITIES

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*See page 3 for Price Pledge

Norton Uninstall Deluxe

Norton Uninstall Deluxe for Windows 95/Windows NT 4.0

Norton Uninstall Deluxe is the safest way to make changes on any Windows 95 or Windows NT 4.0 system, including both removing and adding programs and files. Norton Uninstall Deluxe provides program, file and disk management tools that allow you to safely try new programs, recapture disk space and cleanup your hard drive(s).

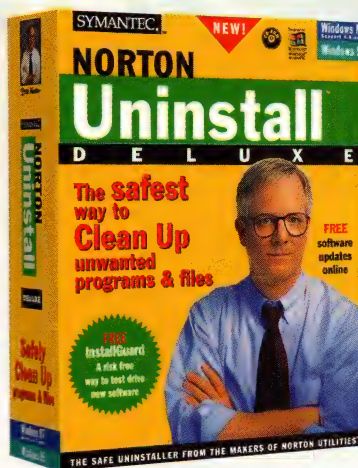
Key Features of Norton Uninstall Deluxe for Windows 95/NT 4.0

InstallGuard — unique to Norton Uninstall Deluxe — enables you to remove the last installation and return your system to its original state.† All files that were overwritten or changed will be replaced with the original files. This unique "undo" feature gives users a risk-free test drive for any new installation.

SafetyScan ensures accurate knowledge of your system and configuration for a safe and complete Remove, Move, Copy and Store of all applications and files — even those that were on the system before Norton Uninstall Deluxe.

System Monitor provides the ability to monitor installations so you can safely and thoroughly remove them with InstallGuard if you encounter any problems.

Folder Selection — unique to Norton Uninstall Deluxe — allows you to Remove, Move, Copy and Store by sub folders, not just application group, application or file. This makes it especially easy to remove suite components, or data files that are stored in a folder within an application group

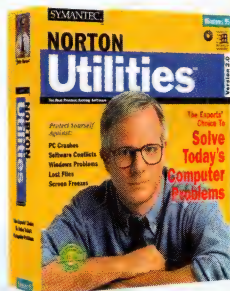


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NOR072 Norton Uninstall Deluxe

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Norton Utilities

Over 15 Million Users World Wide.

Right there, right when you need it Norton fixes problems you wouldn't otherwise know were there until it's too late. The system Doctor monitors your whole system and automatically corrects problems before they affect you.

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- Stops computer viruses before they damage your computer
- Monitors your favourite Web sites
- Automatically downloads software updates and patches

The experts choice

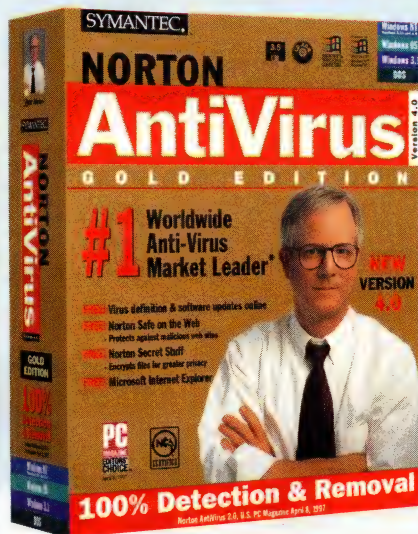
NOR032 Norton Utilities

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Norton AntiVirus Gold Edition



Worldwide Anti-Virus Market Leader*

Norton AntiVirus is the virus protection of choice for over 94% of Fortune 500 companies. Whenever you are on the Internet or sharing files via floppy disk across a network, you run the risk of virus infection. Automatic real-time protection monitors all potential sources of infection. Just load it and forget it. It's that easy.

SARC Asia Pacific

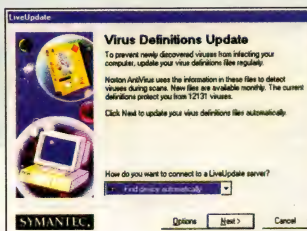
The Symantec AntiVirus Research Centre is the industry's largest virus research lab with a team of dedicated technicians who work around the clock to identify and neutralise new viruses — including the fast spreading Macro viruses.

LiveUpdate

Download current virus definitions free from the Symantec Web site with one click. Schedule future sessions to run automatically. LiveUpdate email also alerts you when new virus definitions are posted from SARC.

Support Service

Symantec's anti-virus products are products backed by quality support service. Virus information and updates can be obtained by contacting your local Symantec FTP site, Website or BBS via Internet, America Online, Compuserve or Microsoft Network.



100% Protection & Removal

NOR074 Norton AntiVirus Gold Edition

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Shift into high gear with the most current updates

VVROOM! TuneUp quickly and securely profiles your system's hardware and software, then immediately generates a list of the latest updates and bug fixes available on the Internet.

No wasting your valuable time calling Customer Support or searching for hours through online lists of program patches and updates. No worries about older versions getting installed over new ones. Just select the updates you want and TuneUp downloads and installs the right ones.

And since TuneUp supports over 3,000 products, you can bet you're covered from Access to Zork. Plus, our pit crew continuously scouts the Internet to stay on top of all the latest updates.

Don't let deadly viruses stall PC

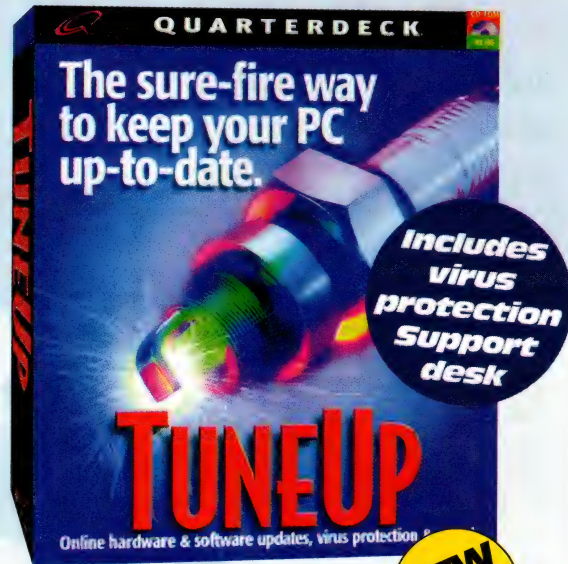
TuneUp AV (Anti-Virus) gives your PC high-octane protection against destructive viruses from floppies, e-mail and the Internet.

It detects and destroys thousands of viruses to keep your PC firing on all cylinders

Open 24 hours-a-day for online service

TuneUp is your direct route to Tuneup.com, Quarterdeck's award-winning, one-stop technical reference Web site. Tuneup.com is available anytime you run into an obstacle.

Get a full TuneUp Not just an Oil Change!	Oil Change V2.0	TuneUp V1.0
Application and hardware driver updates	X	X
Virus protection		X
Tuneup.com reference web site		X



Designed for
Microsoft
Windows 95

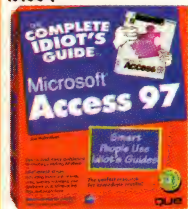
NEW PRODUCT

QUA135 TuneUp Version 1.0 ...

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Idiot's guide to MS Access 97!

ID1004



Only \$24⁹⁵

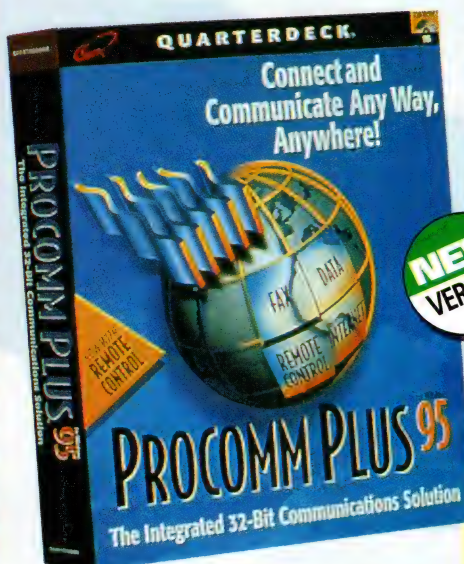
Take away the pain of databases. This guide presents all the information and tricks you need to know!

Index

Category	Page
Product Listing	2
Introduction	3
SOFTWARE	
Microsoft	4-7
Hot Deals	8
PCs/Thinkpads	9
Business	10-19
Graphics	20-24
Utilities	25-40
PERIPHERALS	
Networking	41-42
Multimedia	43-49
Storage	50-52
Inputs	52-53
Scanners	54-55
Printers	55-58
Modems	59-61
Specials	62
Leisure	63-64

Procomm Plus 32

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NEW VERSION

Whether you're cruising the Internet, sending or receiving a fax, or downloading a file from the office, Procomm Plus 32 has

everything you need to communicate via your PC. Fax, Internet and Data functions are seamlessly integrated into one intuitive interface. The quickest, most reliable way to get the most from being connected. Procomm Plus 32 allows you to work at your computer the way you want to, moving from one activity to the next with ease. Procomm Plus 32 also boasts the new feature Procomm Remote which allows you to connect from anywhere to control your office or home PC files and applications as if you were sitting there. Remote control is also a great way to read and send e-mail, share applications and files between your laptop and desktop.

WHAT THE PRESS ARE SAYING

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"...easy to operate, a dream to install"

Micro Computer Mart

Features:

- Fax Manager
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Designed for
Microsoft
Windows 95



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CleanSweep Deluxe
With Internet Sweep!**World's #1 choice for save hard drive clean up!**

A hard drive can be a very filthy place. Especially if you surf the Internet. Every time you install a program, download a file, upgrade or perform even the most mundane disk operations, your computer dribbles a trail of digital debris - clogging up valuable hard disk space. It's now time you called in the world's #1 choice for safe file removal... CleanSweep Deluxe protests against unwanted files downloaded from the Internet, including viruses.

Powerful Internet protection and cleanup

When surfing the Internet, all kinds of debris get on your hard drive. And most of this digital junk you can't even see! Every time you browse the Web, your hard drive can get cluttered with text, graphics, sounds, video files and "Active X controls". Web "cookies" get invisibly placed on your hard drive when you visit certain sites. CleanSweep Deluxe allows you to safely clean these files, reclaiming valuable hard disk space.

Every day a wide range of software pours in from the Web, (trialware, shareware, betas, and browser plug-ins, etc). CleanSweep Deluxe can remove them safely and completely.

Award-winning cleaning power

Like the original version, CleanSweep Deluxe tidies up your hard drive by cleaning away that digital mess. It tracks down all kinds of disk junk - duplicated files, redundant DLLs, orphan files and frequently used files - quickly and easily.

Just activate the automatic wizards to determine which files are clogging up your system, then sweep them all away automatically. Or confirm each action yourself. Best of all, CleanSweep Deluxe safely uninstalls both 16 and 32 bit programs.

Gets in hard to reach places

CleanSweep Deluxe effortlessly guides you through the toughest of file-management chores - understanding and editing the hidden registry that contains the secrets of Windows 95 and Windows NT. Then, the exclusive Registry Sweep sweeps away invalid registry entries, while freeing up disk space.

And with the Application Knowledge Base of over 1,000 programs, chances are if it's on your system, CleanSweep Deluxe knows the safest and most through way to get rid of it.

Won't damage your valuables

CleanSweep Deluxe's exclusive Safety Sweep feature offers the best protection against accidental file deletion of any removal utility you can buy.

CleanSweep Deluxe patrols your system all the time, recording the installation of new software. So you can now remove any new application with 100% safety.

Which CleanSweep is right your you?

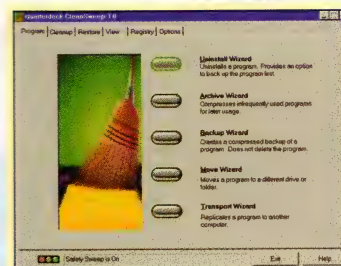
Features	CleanSweep 3.0	CleanSweep Deluxe
Uninstalls and archives applications completely	X	X
Cleans up orphaned, duplicated and unused files	X	X
Offers automatic safety features	X	X
Moves or copies programs to other folders, drives or computers	X	X
Updates itself automatically over the Internet	X	X
Cleans up unwanted files downloaded from the Web		X
Monitors and uninstalls Active X, plug-ins and other Internet programs		X
Includes bonus anti-virus software		X

Features

- Finds and safely removes more files than any other program
- Safety Sweep automatically protects against accidental deletion of important files
- Smart Sweep automatically watches installations for the most effective uninstalls
- Application knowledge base of over 1,000 programs for the safest removals
- Automatically finds wasted space for instant savings
- Intelligently eliminates unused and duplicate files
- Easily moves programs to any location



Cleans up Internet debris & Viruses!
Remove any new application with 100% safety.



Safety sweep "green lights" those files that are safe for you to remove

Update-it

CleanSweep can automatically update itself over the Internet, so you'll always have the most up-to-date application knowledge base

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The most significant release of any CAD software this decade.
- 5 EZ LANGUAGE VERSION 1**
EZ Language V1 is the fun & easy vocabulary pronunciation tutor for 7 different languages.
- 6 LEONARDO THE INVENTOR**
A multimedia exploration of the life works of Leonardo da Vinci. (No 3D glasses)

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QUA137 CleanSweep Deluxe.....

CLE011 CleanSweep 3.0.....

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\$55

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FreeSpace creates hundreds of megabytes of hard drive space by letting you selectively compress files, as well as optimise hard drive clusters. Through these two methods, you'll average 150% more free space for each file you compress! There's no special partitions, no disk doubling, no compressed drives, no special file names and no big slowdowns in system performance. Simply choose the files or programs to FreeSpace, and they look and work exactly the same as before while taking up dramatically less disk space.

Hundreds of Megabytes at your Fingertips
With FreeSpace, you can selectively compress files directly from Windows Explorer or by using a variety of intelligent tools included with the product.

When FreeSpace compresses a file, it also optimises hard drive clusters, which are a major source of wasted space. Files that have been FreeSpaced work exactly as any regular file, with little noticeable slowdown in execution and loading. You don't have to modify Windows, or run any extra programs. And FreeSpace technology works for all kinds of file programs, graphic files, word processing files or databases.

Intelligent tools to help you get more space
With FreeSpace, you're not on your own.

Simply use the FreeSpace Manager to hunt down space-hogging files. You'll get a list of the best possible candidates for compression.

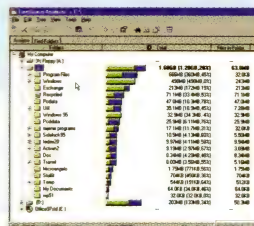
Radically different to other compression products

Unlike disk-doublers, FreeSpace doesn't force you to compress an entire hard drive, it doesn't take up lots of memory, nor does it slow your system down. And, unlike the Zip file format, no specially named file is needed. FreeSpace is completely transparent. And best of all, you select the files you want to compress, without having to make any big commitment

Get more from your "clusters"
Every file must take up at least one cluster even if the file is tiny! So clusters almost always have wasted and unused space.

Some companies sell partition software, which partially solves the cluster problem but splits your hard drive up into too many new drives. With FreeSpace, your

cluster space is automatically optimised when you compress a file,



without having to go through any hassles or headaches!

If you run out of hard drive space, tell FreeSpace how much you need
You're installing a new program, but you can't finish because you don't have enough space, simply tell FreeSpace how much space you need, and you'll get what you need!



Integrated into the Windows Explorer
You can use FreeSpace to find files which are taking up space, or you can simply right-click any file or folder in Explorer, and compress it instantly.

SW5008 FreeSpace **\$89**

ZipMagic

The Next Generation Zip Program

ZipMagix includes the patent-pending ZipFolders technology, which safely and transparently turns zip files into Windows folders. The contents of zip files you download, receive or create become instantly accessible, so you can view and modify files, run programs, archive files, all with spectacular ease - without having to unzip anything. And every file stays compressed in the zip file, saving precious disk space! ZipMagix fully supports the universal ZIP format, as well as other compressed files like ARJ, LHA/LZH, GZIP, TAR, TAZ, TGZ, CAB and ZOO. Opens all compressed files, even email attachments! You can also open and decode email attachments like BinHex, UUENCODE, XXENCODE and MIME. ZipMagix includes an Archive Manager. Only ZipMagix has the revolutionary Internet EasyUpdate, which seamlessly updates your copy of ZipMagix to the latest maintenance release.

AUS132 Zip Folders **\$39**



STOCK CODE: ZIP016

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Index

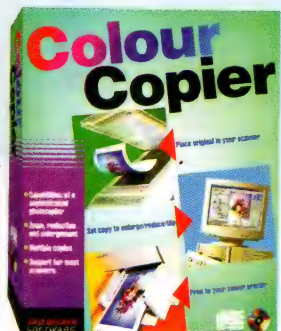
Category	Page
Product Listing	2
Introduction	3
SOFTWARE	
Microsoft	4-7
Hot Deals	8
PCs/Thinkpads	9
Business	10-19
Graphics	20-24
Utilities	25-40
PERIPHERALS	
Networking	41-42
Multimedia	43-49
Storage	50-52
Inputs	52-53
Scanners	54-55
Printers	55-58
Modems	59-61
Specials	62
Leisure	63-64

Colour Copier

Turn your scanner & printer into a colour photocopy.

Colour Copier turns your colour scanner and colour printer into a full-featured photocopier. Simply place your original in the scanner and set your copy features! Large corporations have invested millions in developing the interface for both simple and complex photocopiers. Colour Copier emulates that interface, allowing everyone to produce both simple and complex copies, from the scanner to the printer.

Software comes with position presets or you can create your own. It's so easy!



SW5001 Colour Copier **\$95**

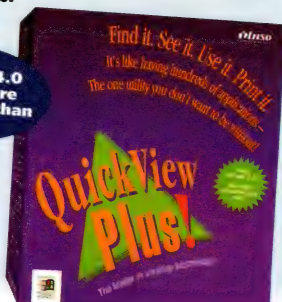
Quick View Plus

Find it. See it. Use it. Print it.

The Unbelievably Useful Utility for Windows 95/Windows NT

See, copy and print virtually any file - with all formatting intact - even if you have none of the originating applications! Quick View Plus is the essential utility for every Windows user! Not only does Quick View Plus seamlessly integrate into Windows Explorer and Microsoft Exchange, it also operates within Netscape Navigator as a plug-in and within Microsoft Internet Explorer as an ActiveX Document viewer.

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DISKEEPER 3.0 New technology improves Windows NT 4.0 performance!

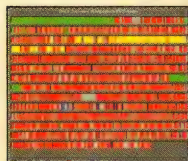
Contrary to popular belief, disk fragmentation is a serious performance issue in Windows NT Server and Workstation. Eliminating disk fragmentation eliminates the primary performance bottleneck that plagues even the best equipped systems providing disk speed improvements of up to 20%.

Diskeeper is guaranteed to eliminate fragmentation as a performance issue and its new directory defragmentation feature being a first making it the most comprehensive product of its kind on the market today.

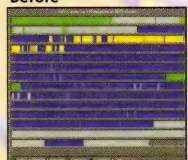
Fragmentation steadily increases the number of pieces in which your files are stored on the disk and it therefore takes longer to read those files. Eventually fragmentation if not addressed will bring a system to its knees. One company found a single file broken into 358,000 separate fragments on their disk!

Designed for the corporate network as well as the home user, Diskeeper Server can remotely manage thousands of Windows NT workstations providing remote analysis and scheduling facilities.

Diskeeper will unleash the true power of your Windows NT systems!



Before



After

"Disk fragmentation can cause performance problems. You should consider running a defragmentation program on a regular basis"

- Microsoft Windows NT Server Resource Guide

"The most commonly used disk defragmentation program for Windows NT is Diskeeper from Executive Software"

- Running Microsoft Windows NT Server 4.0 - Microsoft Press

Features

NEW! Defragments and consolidates directories!

NEW! Group scheduling for single, hundreds or thousands of disks—with just a few mouse clicks!

NEW! Easy Analyse allows administrators to quickly look at any disk on the network for fragmentation. (Server version)

NEW! Full network controls can be run by an administrator from any Windows NT workstation. (Server version)

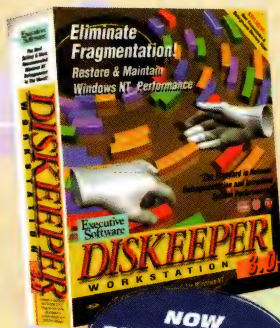
UNIQUE! The only "Set It And Forget It" Defragmenter

EXCLUSIVE! Remotely schedules, monitors and controls defragmentation across the network.

(Server version) Automatically restores and maintains Windows NT system speed and performance.

Defragments multiple disks automatically while system is in use. Time tested—completely safe with all types of disks. Easy to use, flexible scheduling options with five priority settings. Supports Intel x86, Digital Alpha and PowerPC platforms. Safe with EDI, SCSI, RAID, volume sets and mirror sets.

NEW PRODUCT



NOW DEFRAGMENTS DIRECTORIES!

Designed for
Microsoft
BackOffice

WIN 100
1997

BEST LAN TIMES



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Version 2.0 also available which also supports Windows NT 3.51

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Vet AntiVirus Automatic Virus Protection For All Platforms Essential Protection

Virus protection has never been as essential as it is today. New viruses are continuing to appear at an ever-increasing rate and new types of viruses - for instance, Word macro viruses - regularly take the PC World by surprise.

The Internet, intranets, networks, Email, shared disks and shared PCs all enable viruses to spread.

Virus Protection for Your System

VET Anti-Virus Software provides you with the protection you need for your system, whether it is a stand-alone PC or a complex network of PCs in an organisation. (Server-based virus protection is also available - please ask for information.)

VET Workstation protection provides automatic virus protection and removal: it gives your PC a quick once-over each time it is switched on or rebooted; it checks all files as you try to access them, preventing you from using an infected file or disk; it provides automatic detection against thousands of viruses and is able to effectively clean files infected by all of the common viruses.

VET is a tried and tested product, used on hundreds of thousands of PCs in more than 30 countries. It is installed in many universities, government departments, corporate companies, small businesses and home users' PCs. VET is regularly evaluated by independent organisations and continues to rate in the top ten worldwide.

VET Workstation Protection

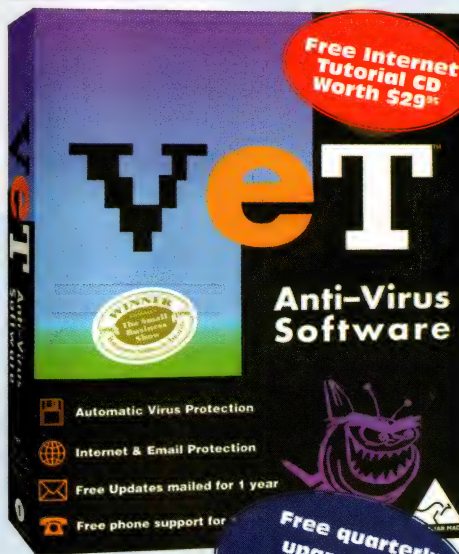
To make things easy, the VET Workstation box contains versions for Windows NT Workstation, Windows 95, Windows 3.x and DOS complete with manuals for each operating system. VET is more than a product - it is a service as well. All registered users receive free quarterly upgrades for the duration of their licence and free unlimited phone support for the same period.

FEATURES

- Automatic Virus Protection
- Internet and Email Protection
- Total Macro Virus Solution
- Update and Support Services
- Network Compatible
- An Essential Product

VET002 VET 2 User licence Pack	\$159
VET003 VET 5 User licence Pack	\$269

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Free Internet Tutorial CD Worth \$29.95

veT Anti-Virus Software

- Automatic Virus Protection
- Internet & Email Protection
- Free Updates mailed for 1 year
- Free phone support for

Free quarterly upgrades for twelve months. + Free support

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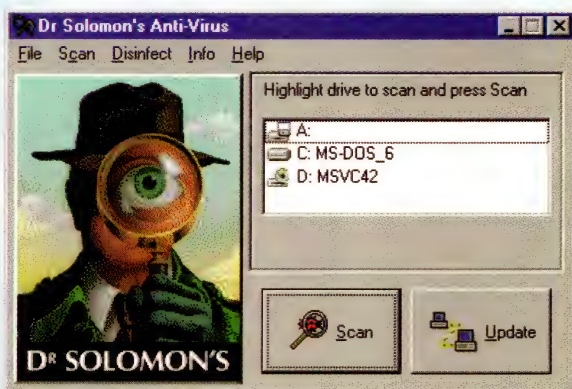
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EVERYTHING FOR YOUR PC - DELIVERED NATIONWIDE!

Dr Solomon's Anti-Virus

Now the international best selling virus protection software is finally available in Australia and New Zealand. Dr Solomon's Anti-Virus detects and destroys the most viruses...automatically!



Exclusive Dr Solomon's WinGuard scanner and Dr Solomon's NetGuard technology provide 24 hour virus protection from internet downloads, shared files, e-mail, floppies, hard disks and more.

Features

- Unique Technology – Dr Solomon's Anti-Virus employs Advanced Heuristic Analysis (AHA) and Advanced Macro Heuristic Analysis (AMHA) technology to reliably detect new and unknown viruses without creating false alarms.
- Compressed File Scanning – Dr Solomon's Anti-Virus has the ability to scan inside more compression file formats than any other anti-virus product, and scan recursively inside multiple nested layers of compressed and archived files.
- Online Updates – Dr Solomon's Anti-Virus' Automatic Protection Plan delivers a new product monthly with updated scanning technology and virus signatures to ensure comprehensive protection against the 300+ new viruses discovered every month.
- New Interface – a new intuitive interface makes Dr Solomon's Anti-Virus one of the easiest ways to protect users from computer virus attacks.
- Automatic Virus Removal with WinGuard – not only will WinGuard, Dr Solomon's on-access virus scanner, protect against virus attack 24 hours per day, but it can automatically remove any file or macro virus it detects.
- Educates with the Virus Encyclopedia. Gives detailed, in-depth descriptions of "In the Wild" viruses most commonly encountered by computer users.
- Money-Back Guarantee. Dr Solomon's Software is so confident that it offers better virus protection than Norton, McAfee, IBM, PC-cillin or VET, it stands behind its product with a money-back guarantee.
- FREE, unlimited 24-hour virus emergency support with one of its technical experts on the phone and by e-mail.

Dr Solomon's Anti-Virus is the only anti-virus product available in Australia that is able to automatically detect and eliminate the over 13,000+ known viruses that are out there, ready to attack your PC.

With over 3 million users worldwide. 24 hour, 7 day technical support and on-line upgrades for killing new viruses it's no wonder Dr Solomon's is trusted by over 3 million people worldwide.

It's the world's most advanced, trusted and widely used anti-virus program.

**Computer viruses are increasing at the rate of 300+ per month.*

Dr SOLOMON'S
Anti-Virus
VERSION 7
"Kills The Most Viruses... Automatically!"

GUARANTEED

Better virus protection than Norton, McAfee, IBM, PC-cillin, VET or your money back.

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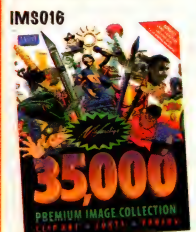
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software@hotkey.com.au

NT005 Dr Solomon's Anti-Virus ...

\$89⁹⁵

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Index

Category	Page
Product Listing	2
Introduction	3
SOFTWARE	
Microsoft	4-7
Hot Deals	8
PCs/Thinkpads	9
Business	10-19
Graphics	20-24
Utilities	25-40
PERIPHERALS	
Networking	41-42
Multimedia	43-49
Storage	50-52
Inputs	52-53
Scanners	54-55
Printers	55-58
Modems	59-61
Specials	62
Leisure	63-64



30

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IF YOU CAN FIND IT CHEAPER CALL US - WE WON'T BE BEATEN!*

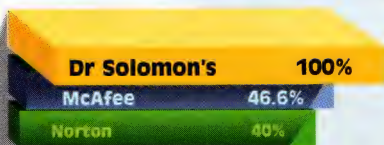
*See page 3 for Price Pledge

HOT UTILITIES

FULL-STRENGTH, 100% ANTI-VIRUS PROTECTION.

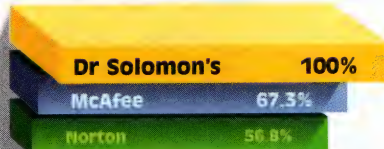
NEW PRODUCT

DETECTION OF VIRUSES IN COMPRESSED AND ARCHIVED FILES



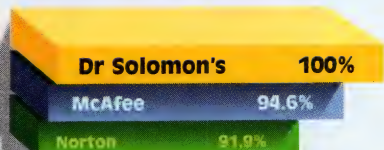
SOURCE — Secure Computing, January 1997
Dr Solomon's is far more advanced in detecting viruses lurking within zipped and compressed files including Internet downloads covering the widest variety of file compression formats.

POLYMORPHIC VIRUSES



SOURCE — Virus Bulletin, October 1996
Polymorphic viruses are the most difficult to detect because each infection looks different. Dr Solomon's detects polymorphic viruses better than all the rest.

MACRO VIRUS DETECTION RATE



SOURCE — Secure Computing, January 1997
Macro viruses represent the newest threat to your computer today, and they're easily shared via documents and email. No other product detects and removes them like Dr Solomon's.



The Best INTERNET VIRUS PROTECTION

GUARANTEED

Better virus protection than Norton, McAfee, IBM, PC-cillin, VET or your money back.

If you want the best in anti-virus software, demand Dr Solomon's Anti-Virus!

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- 6 LEONARDO THE INVENTOR**
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HOT UTILITIES

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- Protect Against GPFs
- Improve Stability
- Prevent Loss of Data
- Windows 95 and 3.1x
- Australian Business Software of the Year



AUS118 RamGate

RamGate

- The Ultimate Windows crash protection STOP WINDOWS FROM CRASHING!!! WITH RAMGATE!

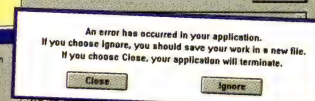
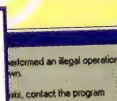
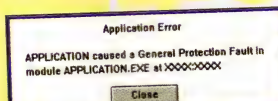
It's frustrating when your PC crashes and, at worst, lose a file's entire contents through corruption. Major problems you can encounter in Windows are:

- Out of Memory
- Insufficient Memory
- Out of Resources
- General Protection Fault (GPF) - commonly known as a crash
- Illegal Operation (Win95 GPF)

RamGate is a utility which stops Windows from crashing by controlling the way in which Windows applications access RAM, virtual memory and Windows system resources. The basic principle behind RamGate is simple; to use memory and resources contiguously. RamGate ensures that when an application makes a request for memory and resources, it is given a block immediately next to the previously allocated block. Additionally, a small buffer zone is built into the request for, and subsequent allocation of memory resources. This basic allocation method is in contrast to that of native Windows which will take memory and resources from anywhere. Continuous use of memory and resources will provide for a more efficient operation of Windows as well as improved stability. This is why you will be able to safely run more applications than ever before.



Have You Ever Been Annoyed by any of these Error Messages on your PC?



\$59⁹⁵

Index

Category	Page
Product Listing	2
Introduction	3
SOFTWARE	
Microsoft	4-7
Hot Deals	8
PCs/Thinkpads	9
Business	10-19
Graphics	20-24
Utilities	25-40
PERIPHERALS	
Networking	41-42
Multimedia	43-49
Storage	50-52
Inputs	52-53
Scanners	54-55
Printers	55-58
Modems	59-61
Specials	62
Leisure	63-64

RESCUE

What would you do if you lost all your data... ..right now?

Data recovery for every Windows 95, Windows, and DOS user.

Rescue Data Recovery Software gives you added peace of mind and handles the greatest concerns of all PC users; drive crashes and data loss! Through its automated procedures and patented "smart" recovery technology, RESCUE helps you to recover one of your most precious possessions; your computer stored information, graphics and data.

Be Prepared...

When disaster strikes reach for RESCUE, the best selling data recovery software for Windows and DOS users. RESCUE is so simple to use. By just pressing a few keys, or with a click of a mouse, anyone can start recovering their own data in a matter of minutes. There's absolutely no technical expertise required!

Your Insurance Against Data Loss

Nothing can stop your hard drive from crashing when its time is due, but RESCUE, like an insurance policy, gives you the peace of mind and the security of knowing your data is safe and available when you need it.

RESCUE Gets Your Data Back, Fast

With RESCUE's patented recovery technology you'll automatically and safely bypass the crash to quickly retrieve your valuable data.

Prevent Lost Time, Lost Work

Instead of agonising for countless hours in front of your computer, let RESCUE do the work for you and recover all your Windows and DOS files including: word processing, spreadsheets, databases, graphics, games, deleted or erased files and even data from compressed drives.

Easy to use:

RESCUE is the most advanced, yet simplest to operate, data recovery software in the market today. It is the first true do-it-yourself data recovery software available. Unlike other recovery utilities that require advanced computer and software understanding, RESCUE operates independently and automatically, executing the recovery actions necessary to retrieve data from crashed hard drives and floppies.

What the press are saying

"In the past general failure messages left you few options. Norton, Central Point or Mace Utilities weren't likely to help.... Now there is a better solution ... RESCUE can recover data from all but the most thoroughly trashed disk... RESCUE works miracles..." *Infoworld*

"RESCUE is a real life saver" *Mobile Office Magazine*

"RESCUE goes further and recovers data even if it is corrupted or if the disk is physically damaged by holes or scratches" *Personal Computer Magazine*

"If you're familiar with the message "error reading drive, Abort, Retry, Fail?" then you know that sinking feeling> RESCUE can now render that message meaningless!" *CFO Magazine*



STOCK CODE: NIT003

\$119

NEW Features...

- Fully automatic data recovery for hard drives and floppies
- Works on compressed drives
- Works on deleted files
- Fast, easy, safe

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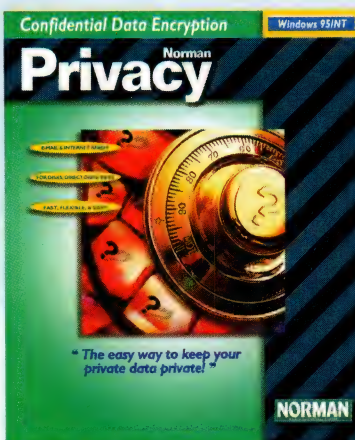


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*See page 3 for Price Pledge

HOT UTILITIES



Norman Privacy

Without Privacy, storing confidential data on your PC or notebook is like leaving your key in your front door. Anyone can get in and probably will. Privacy encrypts your data to make it unreadable without a password.

Install Privacy and you can protect a single word, everything in every folder, or anything between! Privacy is flexible enough to encrypt single or multiple words, files, folders or non-boot hard disks.

Easy to Use

To get some privacy on your PC, all you have to do is select the word, paragraph, file, folder or non-boot disk you want to encrypt and assign a password. That's it.

Once encrypted, only you or anyone you choose to give the password to can read the encrypted data.

What happens to an encrypted file?

Encrypted data is scrambled using a complex series of mathematical formulas, and it stays completely unreadable without the correct password.

Any Application

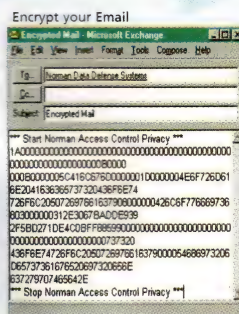
Use Privacy to keep anything you can store on your PC private.

Easy to Install

With Privacy you can conveniently store encrypted data on hard, floppy and removable disk media, including PC cards.



NDD001 Norman Privacy



\$75

NEW PRODUCT

Do you have any of these on your PC?

- Internet and E-mail Access?
- Financials and Accounting Results?
- Important Customer Databases?
- Valuable Formulae or Operating Systems?
- Confidential Agreements?
- Confidential Presentations?
- Staff Salary Packages?
- Staff Performance Assessments?
- Bank Account Passwords or PINs?
- New Product Plans?
- Competitive Analysis Reports?
- Confidential Correspondence?
- Ideas in Development Stage?
- Personal Secrets?
- Embarrassing Facts or Information?
- If so, you need Privacy.

Norman Virus Control

Install Norman Virus Control (NVC) and you'll never have to worry about viruses lurking in your programs or stored documents again. NVC is so advanced, you can be sure your PC will be free of all kinds of viruses, including Macro viruses or those found on the Internet.

Detects & Removes all types of viruses

With the enormous growth of new Macro viruses together with Polymorphic scanners, a new approach to virus control was required. Enter Norman Virus Control, a revolutionary new way of attacking and eliminating viruses. NVC integrates a number of different components to control all types of viruses like nothing else can. Here's how...

Patented Smart Behaviour Blocker

NVC utilises the very latest high-speed artificial intelligence to continuously examine the behaviour of any executed program. Should NVC detect any viruses, the program is disabled before it has a chance to become resident and contaminated the rest of your system. With this amazing breakthrough, NVC virtually eliminates the need for time consuming and costly old style scans.

Heuristic Scanning & Generic Removal

Most virus control packages can only recognise viruses when the virus executes. But now with newly developed heuristic scanner technology, NVC can accurately recognise and remove a dormant virus without prior knowledge of it.

Cat's Claw Macro Virus Protection

Cat's Claw constantly monitors all documents that are likely to contain a Macro virus, including e-mail attachments, and automatically detects and removes any virus as the document is opened. With the current growth in macro viruses, Cat's Claw is an essential component in virus protection.

Fast, Accurate Scanner & Database

A database of all known viruses is included free with this package which means that NVC's high-speed scanner can quickly and accurately identify all known viruses to let you know exactly what you're dealing with. Though virtually unnecessary with NVC, for extra reassurance you can also schedule automatic virus scans and customise search criteria.

Extremely Fast, Transparent Operations

Unlike other packages NVC virtually has no effect on operation times such as copying files or loading programs. NVC is so fast and so intelligent, most users won't notice it until it advises that it has detected and disabled a virus.

Rescue Disk

Included is the Rescue Disk which Scan and cleans an infected hard disk should all else fail.

Boot area Protector

NVC automatically scans the boot sector of a floppy disk when it is accessed. This prevents boot sector viruses from infecting your system.

Cross-Platform Downloads

Versions of NVC are available for single or networked users of DOS/Windows, Windows 95, Windows NT, OS/2 and Novell NetWare.

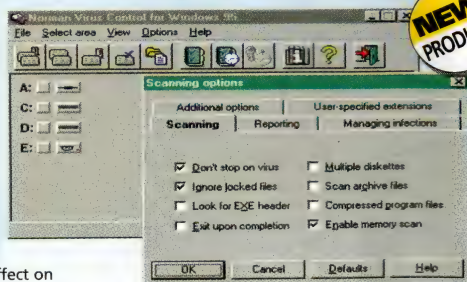
Scan Internet Downloads

Your browser can be configured to automatically use NVC to scan an Internet download even if it is in compressed format.

ALL KNOWN VIRUSES

After testing the world's leading virus control packages against all known viruses, The Virus Bulletin of January 1997 reported: "One product stands alone... Norman Virus Control... the only one to score 100%."

NEW PRODUCT



An updated database of all known viruses is included with this package offers Prevention, Not just Detection



\$89

NDD002 Norman Virus Control

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Massive Stocks

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As an international company we have won more awards for products and services than any software mail-order company.

No.1 Service



33

HOT UTILITIES

INTERNATIONAL SOFTWARE WAREHOUSE Pty. Ltd.

EVERYTHING FOR YOUR PC - DELIVERED NATIONWIDE!

IBM Anti-Virus The Most Advanced Protection for an Infectious World

NEW
VERSION

VMail!

8AN012



Only \$59.

Add Emotion and Personality - Attach a Video or Audio file to your e-mails!

For a limited time only.

No matter how malicious a computer virus is, it doesn't stand a chance against IBM Antivirus. The Software identifies and quickly eradicates more than 10,000 viruses of every shape and form wherever they reside - in memory, on disk, in macro or in a file that someone just downloaded. It can and can even recognise viruses that no one has ever seen before. All with unparalleled accuracy and thoroughness.

Designed for flexibility and ease-of-use, IBM AntiVirus offers a graphical interface, 'Install and forget' automatic operation, and free online support and telephone assistance.

The complete version of IBM AntiVirus for each supported operating system is included in this package, as well as a bootable Emergency Diskette to rescue you when a virus prevents your computer from starting

New in Version 3.0

- Office 97 protection
- Fastest virus scanning available
- Enhanced macro virus protection, including Office 97 macros
- International language support

Superior Reliability

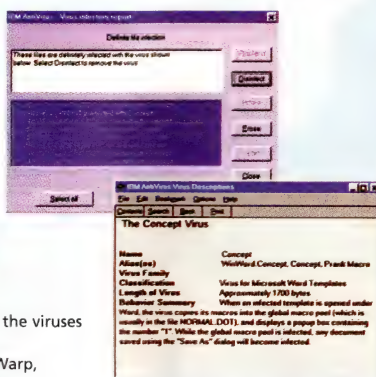
- Virtual eliminates false alarms
- Full verification before disinfection
- Disinfects without damage to programs
- Transparent background operation

Comprehensive Protection

- Detects more than 10,000 viruses
- Certified by the NCSA to detect 1000% of the viruses known to be "in the wild"
- Runs on Windows 95, Windows NT OS/2*Warp, Windows and DOS

Most Advanced Protection

- System Shield lets critical applications run safely, even if infected, without spreading the infection
- Heuristic analysis to identify previously known viruses
- Neural network technology to identify unknown boot record viruses



STOCK CODE: IBM064

\$79

Index

Category	Page
Product Listing	2
Introduction	3
SOFTWARE	
Microsoft	4-7
Hot Deals	8
PCs/Thinkpads	9
Business	10-19
Graphics	20-24
Utilities	25-40
PERIPHERALS	
Networking	41-42
Multimedia	43-49
Storage	50-52
Inputs	52-53
Scanners	54-55
Printers	55-58
Modems	59-61
Specials	62
Leisure	63-64

INTERNATIONAL
SOFTWARE
WAREHOUSE

Net.Medic Your Remedy for Poor Online Performance

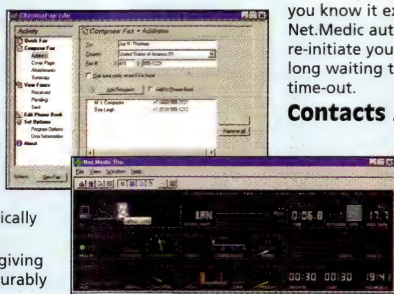
Take Control Over Your Corner of the Internet

Net.Medic is a browser companion - software that works with your Internet browser to monitor, isolate, diagnose, and correct problems that affect you while on the Internet. Now you can identify the source of your network bottleneck - PC, modems, your Internet Service Provider (ISP), the Internet backbone, or remote Web site server. Net.Medic identifies problems in split seconds, offers you recommendations for solving them, and in many cases, automatically fixes them for you.

Net.Medic is the personal Internet utility, giving you actionable information that can measurably improve your online performance. Before Net.Medic, you could only talk about your frustration. Now can do something about it.

Identify and Isolate Your Internet Bottlenecks

Net.Medic identifies performance problems and isolates them to a specific component of your unique Internet path - PC, modem, ISP, the Internet itself, or a remote Web site. Net.Medic animates your end-to-end connections, showing you exactly what is occurring across the Internet, including traffic jams and bottlenecks. Is the problem in the network or at a specific server? Is the network congested or the connection slow? Green, yellow and red indicators highlight the responsiveness of each component. Once a problem is identified, Net.Medic provides you with critical vital signs about the health of the affected component, whether it's your PC, modem, ISP connection, Internet or Web server.



Monitor your Internet Vital Signs

By continuously monitoring activity along your end-to-end connection, Net.Medic tells you exactly what's happening at every critical juncture. Net.Medic reports your throughput, retrieval time, the Web server load and efficiency, as well as network delays and congestion levels.

Remedies Common Internet Ailments

Net.Medic is the only product that automatically eliminates common Internet performance problems before you even encounter them. For example Net.Medic can detect a hung server condition before you know it exists. When this happens, Net.Medic automatically re-initiate your server request, eliminating long waiting times, manual re-tries, and time-out.

Contacts Appropriate Assistance

If a slow-down occurs at a point beyond your PC or modem, Net.Medic can automatically generate an e-mail message to the appropriate contact requesting assistance - including accurate

documentation of the problems you've experienced - and will ask your for permission to send it.

Check your ISP

Net.Medic monitors and reports on the level of service you are actually experiencing.

Optimise Your Environment

Net.Medic continually monitors your ISP connection and Internet conditions, dynamically adjusting your PC and modem configuration to optimise Internet performance.

www.vitalsigns.com



VIT001 Net.Medic

\$99

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34

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Australian PhoneDisc

The ultimate telephone directory on CD-ROM

NEW PRODUCT

Australian software that is smart, fast and easy to use containing over 1 million business and 6 million residential listings Australia wide on a single CD-ROM. Searching is easy: Just type in any of the following: Company Name, Surname, Initials, Suburb, State, Postcode, Line of Business, Area Code or Telephone Number and click the search icon. Phonedisc will then display a summary of the matching entries from its database of 7.2 million records.

View and of the summary records in full detail. Print the record to your printer, copy it to the Windows Clipboard to paste into your other applications, or direct-dial the record using the Auto Dial feature and your modem.



Features:

- Intuitive lab style interface
- Search by Company name, Initials Surname, Suburb, state, Postcode, Area Code, line of business and Telephone Number
- Drop down selection lists are available for the Suburb, State and Line of business search fields.
- Full Boolean searching capabilities
- Print entries
- Copy entries to the Window Clipboard
- Dial entries (modem or auto-dialler required)
- Network and Multi-user versions available
- Ideal for looking up friends, relatives and locating businesses quickly
- Update twice yearly

DTM001 Australian Phonedisc **\$89**

FaxPro

Cost Effective Direct Marketing

NEW PRODUCT

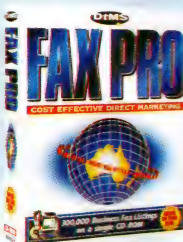
A database of over 300,000 Australian and New Zealand Business Fax Listings on a single CD-ROM

Searching
Fax Pro allows you to perform a variety of searches and gives you the ability to use sophisticated searching techniques such as wild card searches. Once you have performed your searches you can then display, print or export the results.

Exporting
You can easily export your search results to a disk file in comma delimited or fixed file format. Records exported to a disk file can then be imported into another application.

De-Duplication
Fax Pro's de-duplication facility flags or eliminates duplicate records by facsimile number.

Printing
You can print an entire set or the tagged records of a set in a single line report format. The single line report format prints the Company Name Address, Suburb, Postcode, Telephone Number and Facsimile Number details for each record.



Other Features:

- Ability to tag record • Ability to combine sets
- Ability to sort sets • Fax Pro is updated twice a year.
- Fax Pro allows you to search and compile data by:
 - Facsimile Number • Company Name
 - Suburb • Industry Code • IDC • ANZSIC • Business Type
 - Telephone Area Code • State (Australia)
 - Locality (New Zealand)

DTM002 Fax Pro **\$275**

Marketing Pro

The Ultimate direct Marketing Tools

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A Total Direct marketing Solution on a single CD-ROM Over Seven Million Australian Business and Residences at your fingertips

Marketing Pro allows you to search over 7 million national residential, business, into lists, prospect cards, mailing labels and telemarketing reports; Compile data by: Business Type, City, Address, Phone number, Ad size, Postcode, Industry Codes, State, Region, Employee Size, Mobile Phone Number, Directory.

Powerful Software
Marketing Pro utilises the leading edge Australian developed Pegasus Data Retrieval Software. Pegasus is a powerful data retrieval engine with sophisticated compression techniques, perfect for large data bases like Marketing Pro.

User Friendly
Marketing Pro utilises interactive wizards to guide you through common tasks.



Features:

- Query by Example searching..
- Full search Refinement: - Simple to use, and very powerful.
- Contemporary easy to use, User Interface.
- Easy label and Report Printing.
- Sophisticated Report Printing: Create your own reports.
- Fast Deduplication Facility: -Eliminates duplicate records.
- Auto-Dial Facility: - Use Marketing Pro for telemarketing.

DTM003 Marketing Pro Melbourne.....	\$495
DTM004 Marketing Pro Sydney.....	\$495
DTM005 Marketing Pro Brisbane.....	\$495
DTM006 Marketing Pro Vic/Tas.....	\$595
DTM007 Marketing Pro NSW/ACT.....	\$595
DTM008 Marketing Pro QLD/NT.....	\$595
DTM009 Marketing Pro SA/WA/NT.....	\$595
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Partition Magic V 3.0

Reclaim up to 40% of your hard disk & organise your hard drive!

Reclaim Wasted Disk Space

Everyone wants to get the most they can out of their hard disk. But, up to 40 percent of your hard disk may be totally wasted due to inefficient storage methods. PartitionMagic 3.0 increases your usable disk space by shrinking large FAT partitions and restructuring cluster sizes to reclaim up to hundreds of megabytes of lost disk space.

Safely Run Multiple OS's

PartitionMagic 3.0 makes it easy to run multiple operating systems on the same machine without compatibility problems. Explore the new world of Windows 95 or NT while still relying on the security of your current operating system. And PartitionMagic 3.0 includes Boot Manager from IBM, making it easy to select an operating system every time you boot your computer.

Organise and Protect Data

Create a physically separate partition for your valuable data files to protect them from potentially unstable applications. This simplifies backups, especially to devices like ZIP™ drives. And with the transport feature of Uninstaller™, PartitionMagic 3.0 lets you easily move applications from one partition to another with their files and operating system settings in place.



POW022 PartitionMagic 3.0 **\$109**

AUS228 PartitionMagic 3.0 Upgrade **\$59**

Drive Image

No more risks or hassles, Quick back-ups, and complete system recovery. Fast and easy upgrades

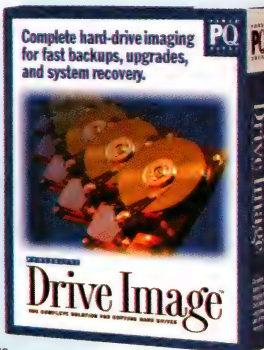
Drive Image is the complete hard-drive imaging solution for hard-drive back-ups, upgrades, and data recovery.

Drive Image lets you easily create a compressed image of file of an individual partition or an entire hard drive. This file can be stored on a network, JAZ, ZIP, CD-ROM, or tape drive and then downloaded to make quick work of backups, disaster recovery, or upgrading to a new, larger capacity hard drive. With Drive Image, image files can be downloaded to drives of the same size or resized to fit drives for a different size and geometry for maximum flexibility.

Drive Images is the fast and easy way to backup recover, or upgrade your hard drive. Using patent-pending SmartSector technology (which copies only used sectors), you can quickly create and store a compressed image file of an entire hard drive, or individual partitions of a hard drive, on a network or other storage devices. Full system recovery is as easy as downloading the image file from storage. If you are upgrading to a new hard drive, the contents of your hard drive can be automatically copied and proportionately resized, saving you hours of re-installation time.

Features:

- Copy the entire contents of one drive to another
- Copy individual partitions or entire drives
- Create and restore hard-drive image files
- Create and store hard-drive image files for backup, upgrades and system recovery
- Change partition size when copying from source to destination



CHK003 Drive Image **\$99**

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*Full product as shown - OEM packaging. Packaging shown for display purposes only.

1 MASTERCLIPS 1000



2 STARFISH INTERNET UTILITIES



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HOT UTILITIES

INTERNATIONAL SOFTWARE WAREHOUSE Pty. Ltd.

EVERYTHING FOR YOUR PC - DELIVERED NATIONWIDE!

Oil Change

**Update Your Software
AUTOMATICALLY Over The Internet!**

New software updates and hardware drives are being released on the Internet every day, designed to fix bugs, improve performance and add great new features to your PC. And most of them are FREE!

You can keep your PC running smoothly if only you could get these updates, but how do you make sure you have installed the updates properly?

No More hours of looking and searching the huge mass of information that is the internet in the hope of finding upgrades to the software you already own and have installed on your PC - CyberMedia's Oil Change will first identify the software that you have installed on your PC, then log onto the internet in order to check with the CyberMedia Internet master list of new updates and drivers that are currently available on the Internet and then give you a helpful

description of each update so you'll be able to make an informed choice. Next Oil change allows you the option of then choosing to upgrade that particular software or move onto the next upgrade or driver that is available. If chosen Oil Change automatically and safely installs the new software. Even after you have downloaded the software you still have the opportunity of reverting to the previous software that you were using because Oil Change saves a version of your present software before installing new software - One click is all you have to do and your computer's original setup is restored! It's that easy and that safe!

- ✔ Locates new updates, patches and drivers for your PC on the internet.
- ✔ Downloads and installs the updates you select.
- ✔ Get new plug ins for your browser.
- ✔ Tunes up your software for peak performance.
- ✔ Keeps your PC up-to-date.
- ✔ Gets you the latest and greatest enhancements for your software.

How does it work?

1. Just click on start and Oil Change identifies all the installed software applications and hardware drives on your PC
2. Oil Change then checks with CyberMedia's master list of new updates and drivers that are currently available on the Internet and gives you helpful description of each update so you'll know what benefit each update will provide
3. A helpful description allows you to select only the updates you want. Oil Change downloads and safely installs your new software automatically

Here's what Top PC mechanics are saying:

- "Could be the most significant program to hit your hard disk in many a moon"
- Netguide
- "The most advanced on-line tune up"
- CNET Television
- "Consider it your own personal upgrade assistant and system maintainer"
- PC Magazine
- "Oil Change ensures your computer is running the newest software... it doesn't get any easier than that."
- Time Magazine
- "(with this) digital oil change.... you have not just software but living software."
- Time Magazine

RMG210 Oil Change

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Kiss Modem Wizard

KIS018



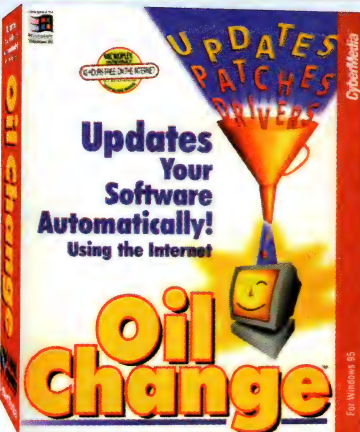
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Connection And
Modem Problems
NOW!

For a limited time only.

Index

Category	Page
Product Listing	2
Introduction	3
SOFTWARE	
Microsoft	4-7
Hot Deals	8
PCs/Thinkpads	9
Business	10-19
Graphics	20-24
Utilities	25-40
PERIPHERALS	
Networking	41-42
Multimedia	43-49
Storage	50-52
Inputs	52-53
Scanners	54-55
Printers	55-58
Modems	59-61
Specials	62
Leisure	63-64



36

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HOT UTILITIES

First Aid 98

First Aid fixes more Windows problems more automatically than any other software.

First Aid 98's advanced database of solutions recognises problems like software conflicts, buggy components, and configuration issues and offers users an easy, one-click solution. It continuously protects against hard disk failure, crashes, software lockups and more. It can even reactivate your PC when your software stops responding! In addition, First Aid will examine your entire PC internet setup (modem, browser connection) and reassemble portions that are broken. When users experience a problem that First Aid does not know about yet, they can send an ActiveHelp Support E-mail. Included in the E-mail is the PC's system information, everything First Aid did to fix the problem, and a description of the problem in the user's own words.

What New for 98

Refined User Interface! First Aid's new interface is easier to use than before. Users can give their PC a complete "Check-Up" or zero-in on a single PC component.

Smarter, More Automatic Fixes! First Aid 98 fixes tens of thousands of Windows problems with a single mouse click. First Aid's expanded database of solutions allows it to stay on the job until the problem is solved.

Emergency Recovery System! PC won't start up correctly? First Aid's new, emergency recovery system now rebuilds Windows. Using its extensive Knowledge Base, First Aid will check every critical component of Windows to make sure all files are working properly. When a problem is encountered, First Aid fixes it by either readjusting your system or reinstalling missing or damaged files.

Finds and Replaces Damaged Files! Plagued by damaged files? First Aid checks to see if actual program files (VXD's, DLL's, 386's etc.) are damaged and replaces the damaged files with their originals (which First Aid reinstalls from the CD).

Fixes All Aspects of Your Web Connection! Having trouble with your Web connections? First Aid examines your entire PC Internet setup from modem, to browser, to Internet Service Provider (including plug-ins) and reassembles any portion that is broken. It updates or reinstalls files as needed, and makes sure you are connected for optimum performance.

Conflict Resolution! Ever wonder why your PC is misbehaving? First Aid will scan your entire PC to see if conflicts caused by buggy software, out-of-sync technical standards or incorrect registry setting are the culprit. First Aid will correct the problem by updating the troublesome component or driver.

Here's What First Aid Will Do For You

- Warn you in advance of hard drive failures
- Correct tens of thousands of known problems and help keep your PC conflict free
- Take the risk and hassle out of adding new programs and multimedia cards
- Search the Internet to find the latest solutions
- Act as your personal, 24 hour technical support expert

What the press are saying:

It's Easy to Use!

"You do not have to be a techie to run this program" - *PC Computing*

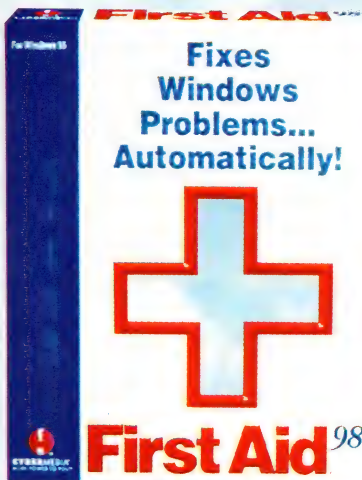
It's Complete

"The aisles are loaded with utility programs...First Aid's advantage is that it's a friendly package that will prevent and mitigate most common disasters without demanding much from users in return" - *The Washington Post*

It's Essential

"First Aid from CyberMedia can be a big help... an assortment of tools that makes running Windows easier" - *Business Week*

Fixes Window Problems Automatically!



Fixes Windows Problems... Automatically!

First Aid 98

First Aid 98 STOCK CODE: RMG211

\$65

New UnInstaller 4.5 for Windows Safer, faster, better!



UnInstaller 4.5 is the only completely safe way to delete applications and files from your Windows PC. It is the world's top-selling Windows clean-up utility and new Version 4.5 is faster, safer and crammed full with great new features that will make UnInstaller your essential personal PC housekeeper.

No matter how large your hard disk is, it's never large enough. Applications, Internet downloads, graphics and multi-media games fill up a hard disk in no time. When you need more space, clearing off the old, unneeded stuff can be risky. With many applications using hidden and shared files, it's difficult and dangerous to delete files by hand. UnInstaller is the safest way to remove files and applications - even the things that were on your hard drive before your

installed UnInstaller! Its exclusive SmartLinks technology scans your entire system and identifies all the relationships between programs and files so that UnInstaller can then decide which files are safe to remove and which ones you need. It will never remove an essential Windows system file! With Automatic Backup you have an extra safety net in case you delete something you wanted to keep. With over 1 million users, nothing is safer than UnInstaller.

LOOK! - Hot New Features...

- **Quick Cleanup** - Tell the Quick Cleanup wizard how much space you need. It searches your system and automatically deletes files that can be safely removed - like temp files and Internet cache files.
- **Application Cleanup** - Delete an unneeded application and its related files, Archive an application to another place on your computer with all its related files intact, or Transport an application to a different computer without the need for reinstallation.
- **File Cleanup** - Find all those unnecessary files that accumulate on your system every day. Regular cleanup makes the most of your disk space.
- **Built-in Viewer Pane** - See the contents of files before you delete them without launching any other applications.
- **Graphical Reports** - Display or printed detailed reports to see how your system has changed.
- **Automatic Installation Monitor** - Automatically starts the the Installation Monitor when an application is installed.

WHAT THE PRESS ARE SAYING

"This software will pay for itself over and over again." - *PC Direct*

"The most well endowed of these utilities by some distance." - *Windows User*

"Head and shoulders above most other similar products on the market." - *PC Direct*

"Of the three programmes tested, only UnInstaller 3 did not offer to remove any critical Windows files." - *PC Magazine*

WIN.95 ONLY STOCK CODE: UN1008

\$65



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HOT UTILITIES

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EVERYTHING FOR YOUR PC - DELIVERED NATIONWIDE!

Everything you need to fix up, clean up, speed up and tune up your system.

NUTS & BOLTS is a package of brilliant, virtually automatic utilities that PREVENT crashes, OPTIMISE your hard drive, ELIMINATE conflicts, REPAIR damage, SECURE files, SHRED sensitive stuff, ALERT you to problems, RESCUE lost files, DIAGNOSES your system, INCREASE speed, FIX glitches and CHECK program compatibility.

FIX UP

Avoid crash-causing application conflicts. Prevents a single crashed application from taking down your entire system. Recover lost files, Fix damaged files, repair shortcuts, directories, and registry and system settings. Boot up after the worst disasters with your own Nuts & Bolts rescue disk.

TUNE UP

Test all your hardware with the push of a button. Optimise and customise your windows effortlessly. Tune your hard drive and Registry for conflict free installation of applications. And keep an eye on your memory and critical system resources to prevent problems before they occur.

CLEAN UP

Dump all those old, unused, duplicate or orphaned files that are cluttering your memory. Delete leftover shortcuts and program groups. Enjoy a lean and mean registry by eliminating useless tips and colour schemes.

SPEED UP

Defragment your hard drive and organise it so that the programs you use most are the front of your hard drive for quick access. Launch your favourite programs with one-click anytime! Optimise and defragment your registry for a faster boot-up.

Nuts and Bolts Repairs and Recovers

Disk Minder - Lost and damaged hard disks are history. NUTS & BOLTS Disk Minder helps you recover from the worst disaster by repairing and recovering damaged hard disks. Plus it finds and fixes many problems - damaged boot sectors and partition tables - that scan Disk can't.

Rescue Disk - You'll never get totalled again with NUTS & BOLTS Rescue Disk you can build a separate single floppy which allows you to access and recover your system even after it's crashed.

Image Restoring - Accidentally format?



Nuts & Bolts Cleans and Optimises

Disk Tune- NUTS & BOLTS Disk Tune reorganises your entire drive for peak performance. How? By defragmenting your files and pulling the ones you use most at the beginning of the hard disk (so you can access them faster). It does all this about 1000% (that's right, 10 time) faster than Windows Defrag.

Registry Wizard - Instant therapy for application conflicts. Every time you add or delete hardware of software you wreak havoc with your registry. NUTS & BOLTS Registry Wizard means automated housekeeping - cleaning, repairing, optimising and fixing the registry for maximum performance.

Cleanup - NUTS & BOLTS Cleanup collects the rubbish left behind by deleted programs and gets rid of it for you. Cleanup can even zip the files you just in case you need them.

Nets & Bolts Secures and Manages

Ez Setup - NUTS & BOLTS EZ setup lets you configure Windows (rename your compute, change icons, Windows logo etc.) to suite your needs and/or taste without having to delve into the Registry.

Stronghold - Keep those prying eyes out of your files. NUTS & BOLTS Stronghold ensures that your secrets remain secret. Encrypted files turn plain English into a sophisticated cipher, which is totally secure. Stronghold also allows you to create self de-crypting files, which you can e-mail to others who don't have Stronghold.

Shredder - NUTS & BOLTS Shredder doesn't just shred, it obliterates. Unlike other shredders, it leaves no trace of deleted files that can resurface later to embarrass you.

Zip Manager - Access your applications with a single click from your choice of a pull down menu.

Protects

Includes full copy of Cheyenne anti-Virus software, including real-time scanning and removal, scheduled scans and updates via the Internet.

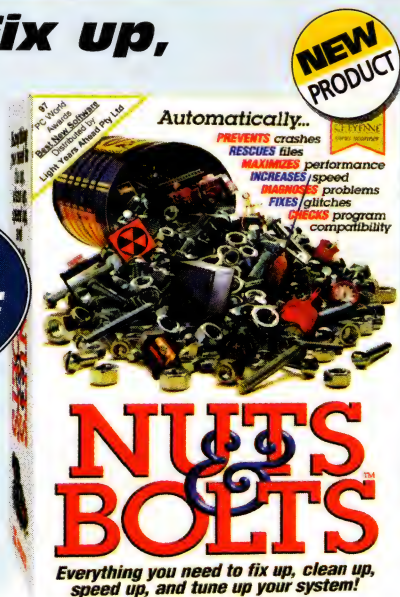
Bomb Shelter - A safe haven for your system NUTS & BOLTS Bomb Shelter saves your data by letting you save crashed or hung programs. But unlike others, Bomb Shelter doesn't stop there. It protects Windows from misbehaving programs, so that a crashing program won't crash your entire system.

WinGauge - Know what's happening before disaster strikes. NUTS & BOLTS WinGauge uses a series of user-friendly gauges to display the status of your system in real time, and warns you of potential problems before they occur.

Trash Guard pro - Yikes! You just deleted that really important file NUTS & BOLTS Trash Guard prevents such accidents and allows you to recover deleted files even from DOS and 16-bit Windows Programs.

Discover Pro - Puts hardware and software configuration at your fingertips. Discover Pro is the only program which tells you how much RAM you open programs are using.

Best New Product of '97



CD-Recordable Optical Disks from Verbatim



Only \$5.99

The Ideal Solution For Desktop Online Archiving!

Index

Category Page
Product Listing 2
Introduction 3

SOFTWARE
Microsoft 4-7
Hot Deals 8
PCs/Thinkpads 9
Business 10-19
Graphics 20-24
Utilities 25-40

PERIPHERALS
Networking 41-42
Multimedia 43-49
Storage 50-52
Inputs 52-53
Scanners 54-55
Printers 55-58
Modems 59-61
Specials 62
Leisure 63-64

Nuts & Bolts out classes the competition!

	NUTS & BOLTS	Symantec Norton Utilities	First Aid 97
Easy to use Central Interface	YES	NO	
Repairs & Recovers Damaged Files & Hard Drives	YES	YES	NO
Automated Clean & Repair Windows Registry	YES	MINIMAL	
Rebuild & Optimise Registry for Maximum Performance	YES	NO	NO
Optimise hard Drive (N&B Disk Tune is up to 5x Faster)	YES	YES	
Cleanup Hard Drive	YES	YES	
Provides Detailed System Info	YES	YES	
Protects Against Accidental File Delete	YES	YES	
Emergency Rescue & Recovery	YES	YES	NO
Hardware Diagnostics	YES	DOS ONLY	MINIMAL
Live System Monitor	YES	YES	NO
Crash Recovery	YES	NO	
Crash protection	YES	NO	NO
Easy System Configuration	YES	YES	NO
Zip/UnZip Files	YES	NO	NO
Drag & Drop Zipping	YES	NO	NO
Zip Integrated with Files & Hard Drive Cleanup	YES	NO	NO
Encrypt / Decrypt Files	YES	NO	NO
High security Encryption	YES	NO	NO
Security Integrated with File Compression	YES	NO	NO
Secure Erase Feature	YES	NO	NO
Secure Erase works with Compressed Drives	YES	NO	NO
Self De-crypting Files for easy E-mailing	YES	NO	NO

Designed for
Microsoft
Windows 95



STOCK CODE: HELO01
\$129

What the Press are Saying

"A complete utility program that knocks Norton Utilities 95 off its feet" - Windows Sources, ZDNet.

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TURN YOUR COLOUR PRINTER INTO A COLOUR FAX.

NOW YOU CAN SEND AND RECEIVE COLOUR FAXES FROM YOUR PC WITH THE WORLD'S FIRST COLOUR FAX SOFTWARE.

Now you can fax in colour! With ChromaFax software PC users can send and receive faxes in full colour. You can fax scanned photos, ads, brochures, in fact any colour document on your PC.

ChromaFax receiver software is included with ChromaFax and is available as a free download from www.compressent.com. So any-one with a Windows '95 PC and a modem can receive and view colour faxes, turning your colour printer into a colour fax machine.

ChromaFax supports the recognised international fax standards, so if the fax destination does not have ChromaFax receiver software, the fax is automatically converted to black & white.

ChromaFax image compression makes it quicker and more reliable than e-mail, it is also faster and cheaper than using courier or overnight delivery services.

Colour faxing can be even quicker than black & white

In testing, using a Pentium 133

VEHICLE	SIZE	TIME
ChromaFax	5.0 Mb	1min 30secs*
E-mail	5.0 Mb	25 minutes**
Courier Service	1 package	2-3 hours***
FedEx	1 package	24 hours****

* 9600 bps transmission speed (typically compresses to than 100kb)
 ** 28.8 bps transfer rate
 *** Quoted courier delivery rate
 **** Standard FedEx rate

with 32 MB of RAM, ChromaFax faxed a 28-page document incorporating a number of colour images in 19 minutes, 46 seconds, while WinFax (faxed the same document in black & white in 20 minutes, 52 seconds.

ChromaFax is also a great black & white fax program so it's the only fax program you'll ever need. You can choose from ready made cover-pages or create your own, import address books, drag and drop multiple files into a single fax, annotate your faxes with sticky notes and highlights, and much more.

ChromaFax from Hot Key. Now there is finally a fax program as up to date as your computer.



NEW PRODUCT

\$115

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NIT010 Chromafax.....

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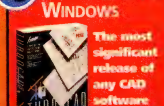
2 STARFISH INTERNET UTILITIES



3 BODYWORKS V3



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Kiss Modem Wizard

KIS018



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Fix Internet Connection And Modem Problems NOW!

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Backup Exec For Windows NT Single Server/Enterprise Edition

Powerful new Seagate Backup Exec for Windows NT sets the standard for enterprise storage management

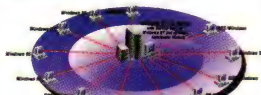
New scalable storage solution architecture provides Intelligent disaster Recovery Options and Advanced Devices and Media management

Seagate Backup Exec for Windows NT is the system of choice for high performance, reliable Windows NT data protection - and the most comprehensive solution for 100% BackOffice compatibility.

As the first backup solution designed for Windows NT, Backup Exec incorporates the Windows NT API's for superior 32-bit performance and ease-of-use. Seagate Backup Exec Intelligent disaster Recovery option provides the only "point-in-time recovery capability for quick, dependable recovery of services. Now in its fifth-generation, Seagate Backup Exec puts you in complete control with 24-hour network-wide scheduling,

administration, monitoring, device and media management. And, Seagate Backup Exec offers pre-defined report writing capabilities with integrated Crystal Reports - for details when you need them.

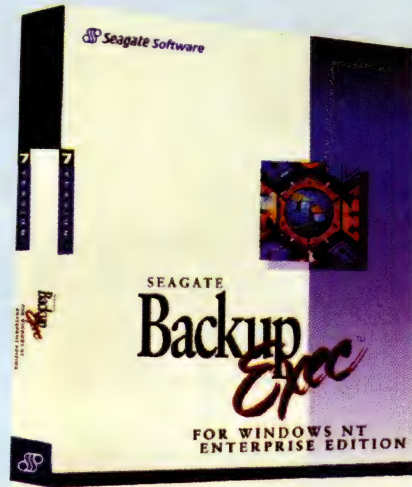
Should you ever need to restore data from backup media created with Microsoft's Windows NT or Exchange Server backup utility, Backup Exec is 100% Microsoft Tape Format (MTF) compatible for effortless recovery. As the developer of the Microsoft Exchange Server and Windows NT backup utility, Backup Exec is the ideal solution for all your data protection needs.



Single Server Edition
Single Server Edition provides network-wide protection for a single server and unlimited client workstations.

- Intelligent Disaster Recovery - Minimize recovery time with the only point-in-time rapid-recovery system for fast, dependable Windows NT server and Workstation recovery.
- 100% Microsoft compatibility - Proven reliability and 100% data interchange with the Windows NT Backup utility.
- Performance Optimisation. Maximise performance, minimise network traffic. Backup time using exclusive Agent Accelerator technology distributed processing/sources compression.
- Integrated Crystal Reports - Provides details at a glance with User-Defined and Pre-Defined reports for network-wide administration, monitoring and management.
- Advanced device and media management - Maximises backup performance with drive pooling, dynamic load balancing, drive cascading, fault-tolerant processing and media overwrite protection.

NEW PRODUCT



Single Server
STOCK CODE: SEA110

\$775

Designed for
Microsoft
BackOffice™

Microsoft SOLUTION PROVIDER

SEA091 Backup Exec 95 V2

\$129

SEA086 Backup Exec NT VS

\$349

Index

Category Page
Product Listing 2
Introduction 3

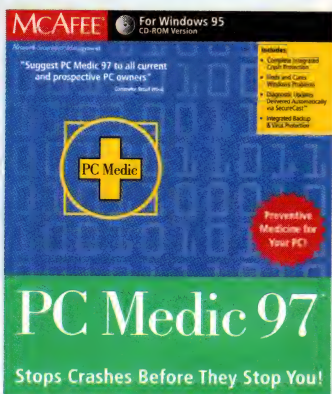
SOFTWARE

Microsoft 4-7
Hot Deals 8
PCs/Thinkpads 9
Business 10-19
Graphics 20-24
Utilities 25-40

PERIPHERALS

Networking 41-42
Multimedia 43-49
Storage 50-52
Inputs 52-53
Scanners 54-55
Printers 55-58
Modems 59-61
Specials 62
Leisure 63-64

PC Medic 97 Stops Crashes- Before They Stop You!



Finds and fixes Windows problems immediately

Have you ever installed software only to find that things that worked yesterday don't anymore? Now there's a tool which can resolve these problems - without hour long technical support phone bills!

- Stays Up-To-Date with FREE automatic Internet upgrades
- Optimises Windows performance
- Provides expert advice on thousands of problems - 24 hours a day
- Automatic backup - Fast restore

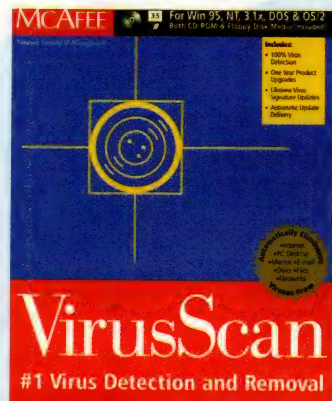
MCA039 PC Medic 97..... **\$69**

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Mcafee VirusScan

McAfee
Network Security & Management

No.1 In Virus Detection & Removal!



Every month, over 200 new viruses damage data and productivity. These viruses are unintentionally received through disks, bulletin boards, on-line services, e-mail, the Internet and organisational networks. Why have millions chosen McAfee VirusScan for their security? Superior virus detection, removal and support services. VirusScan natively supports a variety of desktops with features to keep your system immune from these viruses.

VirusScan scans all system areas to provide extensive security including local and network drives, CD-ROMs, floppies, boot sectors, file allocation and partition tables, folders, files and compression files. It accurately cleans most virus infections from

files, master boot sectors, partition tables and memory.

Features

- One year free upgrades
- 100% Virus protection with Hunter technology
- Convenient to use!
- Security with service and support
- #1 Worldwide anti-virus Market share

MCA034 VirusScan 3.0/95/NT - CD **\$69**



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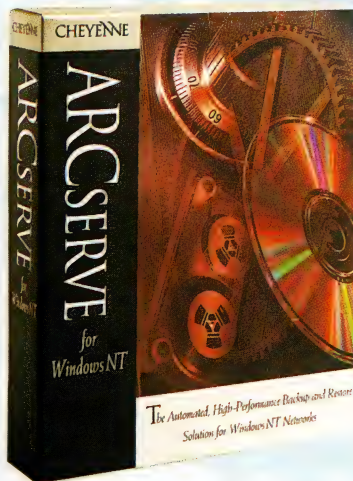
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CHEYENNE ARCserve 6



ARCserve 6 delivers unsurpassed data integrity by combining award-winning features of the ARCserve product line, with the industry's most advanced data recovery technology. Large and small business alike can benefit from ARCserve's superb ability to seamlessly manage data faster and easier than ever. With record-breaking processing speeds, ARCserve 6 can reduce your backup widow dramatically. Have security knowing that the data on your heterogeneous environment is protected.

ARCserve 6 supports not only DOS, OS/2 and Windows workstation, but also has optional modules for UNIX, Macintosh, Windows NT, Windows 95 workstation and your on-line databases.

Ease of Use: With its improved Windows 95-like interface and the new Job Status Wizard, ARCserve makes backing up your data easier than ever.

Manageability: Centralized job management and status viewing allows administrators to quickly access necessary information and to efficiently manage all backup and restore operations.

Integration: ARCserve 6 is fully NDS-compliant and NetWare certified, making it a completely integrated NetWare 4.x application. With just one log-in and one view, administrators have access to all servers and resources on the network. ARCserve 6 allows you to browse NDS trees and choose entire containers or individual objects for backup and restore.

Performance: Add the benefits of distributed processing your backup/restore scheme with ARCserve's Pus Agents. These remote server programs perform all of the file-reading processing, while streaming data across the network to the ARCserve server. This dramatically increases the speed of the remote backup and reduces the overhead on the host server and eliminates repetitive handshaking.

Reliability: ARCserve provides an automated utility for quick restoration of downed servers. By taking a snapshot of the current server environment and synchronizing it to the backup media, ARCserve can automatically rebuild your server from a single tape and disk - with a minimal NetWare installation.

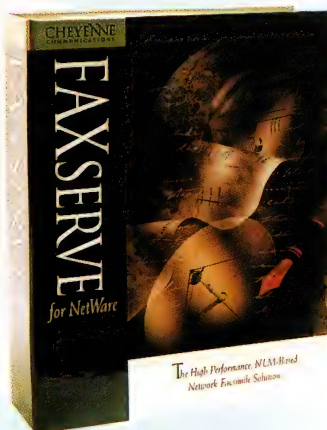
CHE040 ARCserve 6 10 users or less.....

\$449

CHE041 ARCserve 6 (workgroup) 25 & over.....

\$797

CHEYENNE FAXserve



The Award-winning FAXserve is a high performance, NLM-based facsimile solution, designed to integrate seamlessly with Novell NetWare operating systems. FAXserve's easy-to-use Windows interface simplifies faxing for end users and network administrators. Users send and receive faxes directly from their workstations, store faxes in electronic files and share fax hardware with other users on the network. Network administrators can take advantage of FAXserve's centralized administration, scalability, and high performance.

User Benefits

Numerous functions are just a mouse click away with the award-winning FAXserve interface! Send faxes with ease from Windows, DOS, and E-Mail applications. FAXserve features include optional cover pages, automatic redial, automatic notification of inbound and outbound transmission status, and automatic inbound fax routing. Electronic phone books with Quick Dial and Fax Broadcasting features expedite and simplify fax addressing. Send faxes to individuals or groups.

Administrators Benefits

Network Administrators will benefit from FAXserve's NetWare Directory Service support, SNMP Manager support, Windows installation, pre-run configuration check utility, and centralized administration.

Flexible Configuration

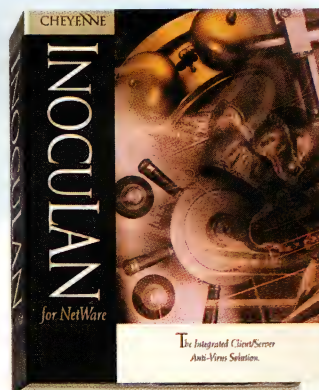
FAXserve supports two server configurations. The first is the Host/Run-time configuration and the second is the single server configuration. With Host/Run, all NLMs and communications hardware run on one server, the Run-time server, while users are logged onto a main server, the Host server. This dedicates more processing power to faxing and leaves the host server free to handle other services.

CHE011 FaxServe 5 users **\$579**

CHE010 FaxServe 10 users **\$1109**

CHE008 FaxServe 25 users **\$1799**

CHEYENNE Inoculan For Windows NT or NetWare



Inoculan is the leading anti-virus solution for Windows NT or NetWare 3.x and 4.x servers, offering unmatched enterprise management and virus protection. Exclusive features of Inoculan include Real-Time Cure, Universal Manager, Virus Wall, Virus Quarantine, Hands-Free Updates, Extensive Alerting options, Support for Windows NT and virus protection for Internet downloads and e-mail attachments.

Inoculan is certified by the NCSA to detect 100% of viruses in the wild, carries the "Designed for BackOffice" logo from Microsoft and has won the Editor's Choice from Windows NT magazine in both 1995 and 1996. Ideal for Windows NT (Intel, Alpha, PowerPC, MIPS) and NetWare enterprises, Inoculan is fully integrated with separate Cheyenne Anti-Virus clients for Windows NT, Windows 95, Windows 3.x, DOS and Macintosh Workstations.

Features:

- NCSA Certification
- Scheduled Scanning with
- Alert Systems
- Windows Interface
- File Server Stratification Utilization Gauge
- Real-time Monitor
- Domain Support
- Flexible Reporting
- Enforcement
- Windows, DOS and Mac Client Support

CHE042 Inoculan (Netware)..... **\$499**

CHE043 Inoculan (NT)..... **\$999**

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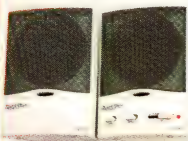


Netgear

-a bay Networks company, offers easy to use, easy to install, affordable networking solutions for the small/medium business supported by a toll free 7 day X 24 hour support number....just in case!

Stereo Speaker System

ACT111



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QS-835

Sound Force 200

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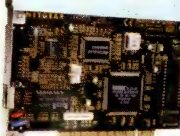
For a limited time only.

FA310 PCI 10/100 Ethernet Adaptor

The FA310 is an auto sensing 100Base-TX Fast Ethernet PCI adaptor designed to support the next generation multimedia power-application.

Features

- 10/100 Mbps to operate with 10Mbps hubs or switches
- Single auto-sensing RJ-45 port
- Lifetime warrantee and free technical support



BAY109 FA310 TX PCI 10/100 Ethernet Adaptor **\$99**

Netgear Network Starter Kit

Ideal for someone with a couple of computers looking to share files and peripherals. Easy to install and easy to use!

Features

- 4 Port 10Mbps Hub
- 2x 10/100 PCI network cards
- 2 lengths cat 5 cable
- Network starter guide



NEW PRODUCT

BAY143 Network starter pack..... **\$275**

10/100 Mbps Ethernet switches

Increase the performance of your existing network by simply incorporating a switch into your current network

Features

- Auto negation - Full/half Duplex
- speed sensing on 10/100 ports
- Plug and play - no configuration required
- Slimline or rackmountable



BAY140 2X 10/100 port - slimline **\$519**
 BAY141 4X 10/100 port - slimline **\$919**
 BAY142 8X 10/100 port - rackmountable..... **\$2449**
 BAY134 8X 10Mbps port **\$799**
 BAY132 2X 10/100 8x 10 Mbps port (RM) **\$1459**
 BAY133 2X 10/100, 16x 10Mbps port (RM) **\$229**

10 Mbps Ethernet Hubs

A range of 4, 8 and 16 port unmanaged hubs. Ideal for users who require an easy to install, easy to use solution.

Features

- Visa LEDs clearly indicate port status
- Push button RJ-45 uplink port for expansion
- slimline or rack mountable
- Limited Lifetime Warranty



BAY131 4 port slimline 10BaseT..... **\$99**
 BAY130 8 port slimline 10BaseT..... **\$129**
 BAY105 4 port slimline 10BaseT, AUI, BNC **\$159**
 BAY104 16 port slimline 10BaseT..... **\$299**
 BAY121 16 port rackmount 10BaseT, AUI, BNC..... **\$399**
 100Mbps Fast Ethernet Hubs available from **\$359**

Index

Category	Page
Product Listing	2
Introduction	3
SOFTWARE	
Microsoft	4-7
Hot Deals	8
PCs/Thinkpads	9
Business	10-19
Graphics	20-24
Utilities	25-40
PERIPHERALS	
Networking	41-42
Multimedia	43-49
Storage	50-52
Inputs	52-53
Scanners	54-55
Printers	55-58
Modems	59-61
Specials	62
Leisure	63-64

APC UPS's

Why do you need power protection? An uninterrupted power supply keeps your equipment safe from power events including surge, swells, brownouts and blackouts - and keeps you safe from downtime that power problems invariably produce.

Back-UPS Pro

- Performance protection for advanced workstations
- Automatic Voltage Regulation
- Multistage surge protection
- Plug and play with Win'95
- User Replaceable, Hot swappable
- Line-interactive Design
- Communication Interface Port

Smart UPS

- Performance Power management for advanced business networks
- SmartBooster and SmartTrim
- Nine Wave output
- Available in Rackmount and Extended Run modules
- SNMP Support Available
- Intelligent Battery Management

All have 2-year warranty

Product Code	Description	Price
Back-UPS Pro Plug and Play		
APC001	Back-UPS Pro 280 Pnp	\$309
APC002	Back-UPS Pro 420 Pnp	\$449
APC003	Back-UPS Pro 650 Pnp	\$519
Smart-UPS and Powerchute Plus		
APC004	Smart-UPS 450 with Powerchute plus	\$669
APC005	Smart-UPS 700 with Powerchute plus	\$719
APC006	Smart-UPS 1000 with Powerchute plus	\$1129
APC007	Smart-UPS 1400 with Powerchute plus	\$1488
APC008	Smart-UPS 2200 with Powerchute plus	\$2309
APC009	Smart-UPS 3000 with Powerchute plus	\$3249
Surge Protection		
APC010	ProtectNet for telephone and Modem lines	\$35

SmartUPS ships with Powerchute plus for NT, Powerchute plus for Netware, Powerchute Plus for Windows, PowerNet SNMP Agent for Netware, HP NetServer Assistant Support (NT and NetWare), Microsoft SMS Support, Compaq Insight Manager (NT and NetWare) Lotus Notes Shutdown Support, DMI Support, Netfinity Support, PowerNetSNMP Agent for NT & SCO UNIX

Back UPS Pro ship with Powerchute Pro PnP for Windows 95, Windows for Workgroups and Windows

APC
AMERICAN POWER CONVERSION

Essential hardware protection

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MULTI-MEDIA

Traxdata CD

Writable Recorders

TraxData CDR 2600EL CD Recorder Kit 2x6x (Internal)

2x Speed Record, 6x Speed Play

Join the world of CD Recording with the TraxData range of easy-to-install, feature rich CD Recorder solutions. TraxData has tested and selected a complete range of components to provide the ultimate in CD recording solutions, all in a single box.

TraxData CD Recorders allow you to record all your favourite elements (Music, Data, Photos or Video) directly to low cost CD-R discs.

Recording to CD could not be easier! Now, with only a few clicks of a mouse, you can turn your PC into a Digital Recording Studio for any type of content that you have!



TRX146 Traxwriter CDR2600EL Int **\$629**

Writable CD Recorders

TraxData CDR2600 includes:

- CD Recording Software for Windows 3.1x,
- Windows 95 & NT
- UDF Recording Software for Windows 3.1, '95
- Label Design Templates
- 2 CD-R Discs
- Power & SCSI Cables
- Fixing Screws
- CD Marker Pen
- Manual



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Manage your diary, contacts, meetings and communications via the Internet.

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EZ Language V1 is the fun & easy vocabulary pronunciation tutor for 7 different languages

6 LEONARDO THE INVENTOR

A multimedia exploration of the life works of Leonardo da Vinci. (No 3D glasses)

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43

TraxData CDR 4600EL CD Recorder Kit (Internal)

4x Speed Record, 6x Speed Play

Kit Includes:

- TraxData CDR4600
- CD Recording Software for Windows 3.1x, Windows '95 & NT
- UDF Recording Software for Windows 3.1, '95
- Label Design Templates
- 2 CD-R Discs • Power & SCSI Cables
- Fixing Screws • CD Marker Pen • Manual



TRX147 Traxwriter CDR4600EL Int **\$929**

TraxData CD Recorder Kit CDE2604P (External Parallel Port Connection)

2x Speed Record, 6x Speed Play

Kit Includes:

- External CD Recorder
- CD Recording Software for Windows 3.1x, Windows '95 & NT • UDF Recording Software for Windows 3.1, '95 • Label Design Templates
- 2 CD-R Discs • Power & Parallel Cables
- Fixing Screws • CD Marker Pen • Manual



TRX148 Traxwriter CDE2604ELP Ext **\$799**

TraxData Accessories Kits

Allows users to record audio tracks directly from CD ROM, Hard Drive or Database using Drag and Drop on to CDR. Also enables the removal of crackles and hiss from studio tracks, the creation of layouts for booklet, inlay card and CD label, multi-session audio recording and on the fly audio recording.



Music Kit (Traxaudio Pro software, 1x CDR, Audio Cabling and Jack Plug)

TRX142 Music Kit **\$89**

External Case and SCSI Cable - Upgrade to an external unit

TRX104 External Case and SCSI Cable **\$210**

ISA Bus Mastering Card, 1x CDR, SCSI Cable, Power Cable and Screws

TRX143 ISABus Mastering Card **\$119**

PCI Bus Mastering Card, 1x CDR, SCSI Cable, Power Cable and screws

TRX145 PCI Bus Mastering Card **\$119**

Mitsubishi Consumables and Storage

Scratch and win one of 10 luxury holidays to Barbados when you buy TraxData Gold CD Media. Thousands of other prizes to be won. (Ends December '97)



TRX 103 Traxdata 74min CD Recordable Media with Datagard Protection (Gold/Gold)	\$5.99
TRX 105 Mitsubishi 74min Platinum CD Recordable Media with Coating (Silver/Blue)	\$5.99
TRX 135 Mitsubishi 650MB Rewritable CD Jewel Case	\$49
TRX 125 Mitsubishi 650MB CD Rewritable Cartridge	\$59
PressIT Labeller	
TRX 107 White Labels for PressIT Labeller (pack of 50)	\$25
TRX 108 Red Labels for PressIT Labeller (pack of 50)	\$25
TRX 109 Yellow Labels for PressIT Labeller (pack of 50)	\$25
TRX 110 Blue Labels for PressIT Labeller (pack of 50)	\$25
TRX 111 Gold Labels for PressIT Labeller (pack of 50)	\$35
TRX 112 Silver Labels for PressIT Labeller (pack of 50)	\$35
TRX 113 Clear Inkjet Labels for PressIT Labeller (pack of 50)	\$49
TRX 114 Clear Laser Labels for PressIT Labeller (pack of 50)	\$49
Storage disks	
TRX 131 Mitsubishi IBM Formatted 3.5" Black Diskettes individually wrapped (box 10)	\$9.99
TRX 130 Mitsubishi IBM Formatted 3.5" Colour Diskettes individually wrapped (box 10)	\$10.50
TRX 132 Mitsubishi IBM Formatted 3.5" Black Diskettes in Library Case (box 10)	\$9.99
TRX 133 Mitsubishi IBM Formatted 3.5" Colour Diskettes in Library Case (box 10)	\$9.99

PressIT Custom CD Labeller

Give your CDs a professional image.



TRX106 PressIT

The PressIT CD Labelling Kit uses a clever yet simple design, allowing you to put professional looking labels on your CDs. This neat and compact labelling system provides the perfect answer to all those CD labelling task which, up to now, have been a real problem. The PressIT uses special die-cut labels (available in a range of colours as well as clear plastic), which can be printed using either an inkjet or laser printer.

PressIT's unique system positions and applies the labels perfectly centered and bubble free every time.

Included in the package are 20 assorted labels and Design Express software that makes creative design straight-forward, together with templates for most MAC and PC based graphic

For Macs: MSWord, Photoshop, QuarkXPress, Illustrator, Freehand, Pagemaker, Claris Works.

For PCs: CorelDraw!, Photoshop, QuarkXPress, Illustrator, Freehand, Pagemaker, MSWord

\$79

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HP SureStore CD-Re Writable

7100i/7100e

- Write, update and rewrite
- Create CDs for CD-ROM and audio players
- Simple as a floppy with all the qualities of a CD

The new HP SureStore CD-Writer Plus offers you versatility. Think of RW-CD rewritable discs as a high capacity, durable floppy. With the HP SureStore CD-Writer Plus you can write, update, erase and rewrite up to 650 MB of data on a single CD, up to 1,000 times per sector per disc. Or make your CDs on CD-R media creating permanent archives of all your critical data with the assurance that the data is secure for up to 100 years.

Share information. With millions of CD-ROM readers worldwide, recordable CD is the ideal way to store and distribute powerful, effective and impressive multi-media presentations. And now with rewritable technology you can easily share or update information.

The HP SureStore CD-Writer Plus has built-in versatility. You can read all your existing data and music CDs, burn CD-R media and use the latest technology in write and re-write CDs. It's easy to make your own CDs. HP SureStore CD-Writer Plus is the simplest way to make CDs. The CD-Writer Plus comes complete with everything you need to begin making CDs right away, including a blank HP CD-WR rewritable disc. A Multimedia QuickTour gets you up and running in minutes and the intuitive software, included with your HP SureStore CD-Writer Plus, lets you create CDs with a simple drag and drop.

Features:

- Rewritable
- Easily connects to PCs parallel port interface
- Simplicity in making your own CDs
- Potable - share between PCs, laptops or locations
- Meets industry standards
- Performance - 2X recording speed allows you to write 100MB in approximately five minutes
- Multi-session compatible
- Capacity - 650 MB data or 74 min audio
- Durable media - up to 100 years shelf life (CD-R)
- Hewlett-Packard Customer Support via BBS, Website or Telephone
- Includes one year limited product warranty.

NEW PRODUCT



Package includes:

7100i - Internal drive, installation guide (CD), Adapter Direct CD, Easy-CD Audio, CD Copier and Jewel Case Designer software, IDE data cable and one blank HP CD-WR Disc.

7100e - External drive, installation guide (CD), Adapter Direct CD, Easy-CD Audio, CD Copier and Jewel Case Designer software, driver diskette, parallel data cable, audio cable, power supply and one blank HP CD-WR disc.

Designed for
 Microsoft Windows 95

HWP250 HP 7100i (Int)	\$809
HWP251 HP 7100es (Ext)	\$989
HWP252 HP CD Rewritable CD	\$45⁹⁵
LNX001 Writable CD (5 pack)	\$45

Beavis and Butthead. Screen Saver.

GVA007



Only \$49

Choose from 30 wallpaper stills. More than 80 video clips from 3 seasons of the MTV series!

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Index

Category	Page
Product Listing	2
Introduction	3
SOFTWARE	
Microsoft	4-7
Hot Deals	8
PCs/Thinkpads	9
Business	10-19
Graphics	20-24
Utilities	25-40
PERIPHERALS	
Networking	41-42
Multimedia	43-49
Storage	50-52
Inputs	52-53
Scanners	54-55
Printers	55-58
Modems	59-61
Specials	62
Leisure	63-64

HP Colorado 5GB and 5GB External

Breakthrough performance for notebook PC and desktop PC backup

Looking for a PC backup solution that won't keep you waiting? The new HP Colorado 5GB and 5GB external delivers dazzling performance.

Both provide an impressive capacity of up to 5GB on a single data cartridge. The HP Colorado 5GB stores data at a rate of up to 55MB per minute, while the 5GB external stores data at a rate of 40MB per minute. And because it is extremely light, the external model makes a great companion for your portable PC.

Included with the 5GB is the Install Assistant software which automatically detects your system configuration, and guides you through the installation of your internal drive, step by step. Using your tape drive is just as easy, with a choice of one-button or automated daily backups.

And should disaster ever strike, the Windows 95 disaster recovery software gets you back in business fast by allowing you to do a full restore of your hard drive without first having to reinstall your Windows 95 operating system.

Features:

- 2.5GB native capacity, up to 5 GB compressed
- 40-55MB/min backup speed
- Includes Colorado Backup by Computer Associates for Windows 95, Windows and DOS
- Supports Windows NT 4.0 backup utility
- Install Assistant software for easy installation and configuration of internal drives
- Disaster recovery for Windows 95
- Low cost HP Colorado 5GB media
- Two year limited warranty

NEW PRODUCT

Ideal for notebook PC and desktop PC backups.



hp HEWLETT PACKARD
Registered Reseller

HWP301 HP Colorado 5GB Internal	\$399
HWP302 HP Colorado 5GB External	\$529
HWP303 HP Colorado 5GB Minicartridge	\$49

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Mate

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Say "Good Buy" to costly international and interstate calls with the worlds first Internet Telephone with Full & Half Duplex Software.



NEW PRODUCT

Say "Good Buy" to costly STD and ISD calls

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- No IRC Server Connection needed
- No need to join a chat room
- Direct Call via E-mail address
- Easy to Install
- No technical knowledge required



UTC006 InternetMate

\$139

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Take Your Notebook Out Of The Prehistoric Era.

SOUND

Mate

The SoundMate is specifically designed to bring old Notebooks into the multimedia age. This completely portable multimedia system includes a 12x CD-ROM and a 16 bit sound card all encased in a small lightweight multimedia unit.

Also included is a FREE software package consisting of Asymmetric Web Publisher and Trispective 3D Eye Drawing programs, allowing you to create Web pages up to any magnitude.

Features:

- 16 Bit Stereo sound
- Latest 12x CD-ROM Drive
- Simply plugs into parallel port
- High quality stereo speakers
- Talking software

FREE Software Titles valued at \$548



\$599

UTC002 Sound Mate

Idiot Proof Multi-Media

EASY

Mate

— Just plug in and play.

- External 12x Speed High Performance CD-ROM
- Front Loading motorised tray, no caddy required
- High speed reading transfer rate (sustained) 1800KB/second using a high speed parallel port
- High speed access random average: 10ms
- Supports High Sierra, ISO 9660, CD-ROM XA, Photo CD & CD-Audio formats
- MSCDEX compatible includes MSCDEX



Includes: 12x CD-ROM and all Cables & Drivers. With bonus Asymmetrical Software - Web Publisher & Tri-Spectives 2D Eye

Bonus Asymmetrical Software

UTC001 Easy Mate

\$399

The Power To Create Your Own CDs

CDR

Mate

ATAPI (E-IDE) CD Recordable
6 x Read - 2 x Write

CDRMate CD Writer offers the complete solutions for:

Designing: Creative Multimedia Presentations, Video, Animation, 3D-Effects, 3D Web pages
For Work: Sales/Marketing Information Distribution, Archiving Data & Company Profiles
For Home: Make Audio CD's, Save Important Data, Create Stunning Resumes, and Add 3D Web Effects to Home Pages & View Photo CD's

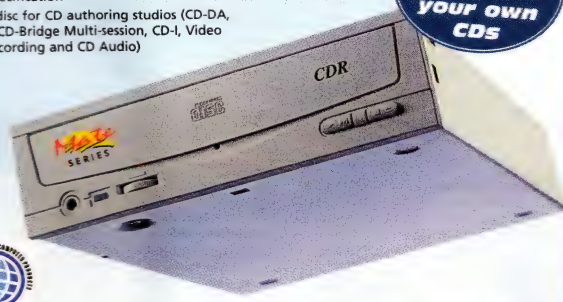
Archiving: Archiving Maximum of 740 MB of information storage
Provides fast random access to archive data in numerous market areas from graphic to multimedia

Provide low cost per Mb removable storage (Compact)

Provides good data integrity for long term storage

Flexible: Recording Disc can be read on every available CD-ROM player
Conforms to write-once format within the standards of the Orange Book Specification

Master disc for CD authoring studios (CD-DA, CD-XA, CD-Bridge Multi-session, CD-I, Video Data Recording and CD Audio)



The power to create your own CDs



UTC005 CDR Mate 6 x Read - 2 x Write

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Viper V330

Introducing the true 128-bit accelerator.

Get ready to think fast with the ultimate 2D, 3D, and video accelerator. Diamond Multimedia's amazing new 128-bit Viper™ V330 leaves all those 64-bit cards and the other "so called" 128-bit cards in the dust. The Viper, powered by NVIDIA's RIVA 128 chip, blazes through the most complex 2D business graphics with its huge 1.6GB per second bandwidth and 4MB 100MHz SGRAM memory. And, with its explosive new 3D engine, it won't ever compromise screaming fast frame rates for phenomenal animation and visual quality. As a result, the Viper delivers stunning realism for your 3D business and entertainment applications. If our unofficial testers could talk, they'd tell you that no other accelerator brings together such an impressive combination of 2D speed and 3D graphics.

Features

- Record-breaking acceleration for Windows NT and Windows 95
- Phenomenal 3D frame rates—supports 20 billion operations/second
- Engineered for Direct3D—the most widely-supported game API
- Advanced video features—supports TV-out for big screen computing
- Provides seamless upgradeability to TV tuner, video capture, and DVD
- Bundled with 8 hot business and gaming software titles, including IF-22: The Realistic Simulation of the F-22 Raptor and Moto Racer

2D Acceleration

Viper V330	140
Matrox Millennium II	110
Viper V330	90.3
STB LightSpeed 128	

3D Acceleration (with quality check on)

Viper V330	328
Matrox Millennium II	64.2
STB LightSpeed 128	61.5

Measured in WorkUnits™

DIA040 Viper V330 **\$409**

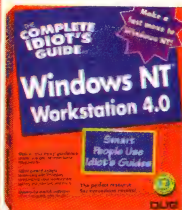
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PRODUCT



Idiot's guide to Windows NT Workstation 4.0!

ID1002



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A Quick and easy step by step overview to help new and upgrading windows users!

STEALTH II S220

Unbelievable combo of advanced 3D graphics and 2D acceleration.

Break through to brilliant graphic performance in every Windows application plus mind-blowing 3D and full-motion video for gaming, multimedia and Internet multimedia. Stealth II makes legendary Stealth performance more affordable than ever. Unlike other graphic accelerators that are strong in 2D or 3D, but not both, Stealth II delivers envelope stretching performance for everything from spreadsheet to shootouts. Stealth II is equipped with 4Mb of fast SGRAM, is designed for the PCI bus and is windows 95 plug and play compatible. Plus it includes a game sampler CD ROM and is upgradeable to must have technologies including DVD, TV tuning and video capture.

Features

- Outrageous speed
- Millions of colours
- Radical 3D Gaming
- Breakneck Windows performance
- Advanced 3D Rendering for Unbelievable 3D Gaming
- 4 Mb fast SGRAM Memory for Optimum Graphics Display
- Upgradable to DVD, TV tuner and Video Capture

FREE! Game sampler CD-ROM

including Forsaken, Motor Racer, Half Life-AVI and SODA Off Road Racing, Terracide and Wipe Out XL.

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DIAMOND
MULTIMEDIA

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PRODUCT



DIA041 Diamond Stealth II **\$235**

VideoDirector Studio 200

Turn your raw video footage into perfectly edited productions.

Editing your video use to be a juggling act - trying to fast-forward to just the scenes you want to copy.

Choose the best, edit the rest!

Just play your video through the VideoDirector Studio mixer and it automatically detects and marks the beginning and end of each new scene. Then grab the first frame of every scene and remembers where it is on the tape. To edit, just drag and drop your favourite scenes in the order you want. It couldn't be easier!

Tell the story with titles and transitions.

Once you have selected your scenes and put them in sequence, you can add true, professional-quality transitions - choose from over 100 Wipes, Fades, and Dissolves! Or add coloured, transparent, or drop-shadow titles.

Now here this... A professional sound track

Next, record some narration for your video, add music, and even sound effects. VideoDirector Studio 200's audio features give you control of the soundtrack of your personal production.

As easy to use as your camcorder!

When you have finished with your production, just click on "Make Tape." VideoDirector remembers the location of every scene on your source tape and then automatically finds and record each shot and effect your have selected. In minutes, you will have all the highlights to your video on one exciting tape.

Easy to install - Start editing in minutes!

Setting up VideoDirector Studio 200 to work with your PC is easy! Just attach it to your computer's parallel port, connect your camcorder and VCR using standard cables, and you are ready to go. Best of all, you don't have to open up your computer and VideoDirector does not fill your hard drive with huge video capture files.

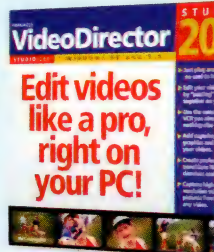
Grab high-resolution video frames in a snap!

Video Director Studio 200 captures still frames from your videos, too. Just pick any image your camcorder can see and grab an instant digital "Snapshot". You can add it to any PC document, or even edit it back into your next video production.

Package Includes

- VideoDirector 200 Mixer: (Connects to your PC's parallel port. Includes S-video and composite video inputs/outputs and printer pass through.)
- Smart Cable (Controls your camcorder and VCR)
- VideoDirector 3.0 software
- Title Editor 3.0 software
- Audio Editor software
- CD-ROM of Clip Media

NEW
PRODUCT



Stock Code NIT004

\$649

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*See page 3 for Price Pledge

COMPRO Super Pack

Open the Compro Super Pack and find your choice of a fast Compro 12X or 24X CD-ROM drive plus Sound Card and a pair of Compro Stereo Speakers

For even greater value to the 1997 Best '7" pack, 7 new fantastic CD titles have also been included.

3D/EYE TriSpectives 1.0

TriSpectives is a complete 3D-drawing program for Windows 95. With over 1,000 professionally designed 3D Intellishape models, you can use TriSpective to create amazing 3D animation, illustrations and drawings.

Asymetrix Digital Video Producer 4.0

Asymetrix Digital Video Producer 4.0 is the easiest tool available to assemble digital movies and edit video and audio clips on your desktop PC

Asymetrix 3D F/X 2.0

3D F/X is graphics and animation software that allows Windows 3.1/95/NT users to create high impact professional-quality rendered images and animation.

Compel 2.0

Interactive presentations made easy. Work with text, graphics, animation, sound and video to create stunning interactive presentations.

Web 3D

Web 3D is the easy way to put incredible 3D images and design elements into your home pages. Compelling graphics and up-to-date information are keys to getting new and repeat visits to your home page.

Web Publisher

Choose from 20 different completed sets of professionally created theme templates, which include banners, buttons, backgrounds and other Java powered graphic elements.

Encyclopedia Of Their Sacrifice

Their Sacrifice CD ROM captures the sounds, sights, thoughts and lives of Australians both at home and at war during World War II. The CD contains over 400 photos and images and 30 minutes of original film, and 90 minutes of recordings.



1997 BEST 7 PAK

- ★ Grolier 1997
- ★ Mega Race 2
- ★ Masterclip 10,000
- ★ ChessMaster4000 Turbo
- ★ Mavis Beacon Teaches Typing
- ★ U.S. Atlas
- ★ World Atlas

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CMP001 Compro Super Pack (12x CD ROM Drive) **\$299**

CMP002 Compro Super Pack (24x CD ROM Drive) **\$315**

The 1997 Best '7' Pack includes:

- Grolier 1997, Mega Race 2,
- Master clips 10,000, Chess Master 4,000 Turbo, Mavis Beacon Teaches Typing, US Atlas, and World Atlas.



COMPRO Digital Internet Camera -Premium Pack

Make your creative ideas a reality with the COMPRO Digital Camera!

The COMPRO Premium Pack comes with the following software:

D-Viewer, a user friendly Windows compatible software application that allows full control of d-Cams functions for optimal image capturing.

AVI Driver - A Microsoft MCI compliant software driver that allows you to interface the camera directly to your favourite Video Conferencing software or any other AVI application.

TIWAIN Driver - An industry standard still image capturing device driver that allows you to interface the camera directly into your favourite TIWAIN compatible image enhancement, painting or Photo ID software.

The Compro Super Pack consists of:

- Compro Digital Camera
- Fiber & Wireless
- MediaPhone Video Conferencing Software - An easy-to-use yet feature rich Video Conferencing software that allows you to conference over the Internet and Normal Telephone line.
- Ulead Video Capture / Editor - A useful motion picture capturing tool that allows you to record video and audio clips and save to AVI files.
- Ulead Image Editor / Viewer - A powerful still image enhancement and photo touch-up tool that gives you full control over image characteristics, a special effects and painting functions to create your ideal picture.
- Ulead Photo Album - A user friendly image database that allows graphical browsing and retrieval of images. Supports OLE feature that enables you to drag and drop
- Ulead Imorph Editor software - Allows you to generate fantastic Hollywood morphing effects found in the movies.
- Asymetrix Video Producer Version 4.0 Software -
- Compro Microphone on Stand

CMP003 Compro Internet Digital Camera

\$299

All prices INCLUDE sales tax. Prices subject to change, see page 3 for terms & conditions.

COMPRO CD Recorder Kit

High Speed Operation - The 4x writing speed reduces the time taken to complete write operations compared with conventional CD recorders. The 8X reading speed is capable of fetching up to 1.2MB per second

Fixed and Variable Packet Writing - Compro CDR 7502 supports fixed and variable packet writing which significantly reduces the overhead of incremental writing. Also supports Direct CD

Running Optimum Power Control (OPC) - Compro CDR 7502 supports OPC which dynamically regulates the laser power to suit media from different manufacturers which means most CDs can be used with Compro CDR 7502

Easy Installation and Operation - Compro CDR 7502 CD-Recorder kit includes a [plug and play SCSI card and comprehensive user manuals to ensure smooth installation and operation. The CD recording software offers intuitive Graphical User Interface with detailed on-line help.

Highest Reliability - Compro CDR 7502 Drives are developed and manufactured by Matsushita in Japan to ensure the highest reliability. Each drive has been carefully calibrated to conform to major CD standards.



The Compro CD Recorder Kit consists of;

- Panasonic CW-7502 Drive (4 write X 8 read)
- Adaptec SCSI controller card
- Gear CD mastering software and Direct CD software
- Asymetrix WEB3D and WEB Publishing software
- Asymetrix Compel 2.0 and 3D F/X 2.0 software
- 2 Blank CDs plus a 16 CD carry case

CMP004 Compro CD Recorder Kit

\$945

Choose a Free CD with every order!*

*Full product as shown - OEM packaging. Packaging shown for display purposes only.

1 MASTERCLIPS 1000



A collection of professional colour clipart

2 STARFISH INTERNET UTILITIES



Manage your diary, contacts, meetings and communications via the Internet.

3 BODYWORKS V3



Learn all about the human body with multi-media guide.

4 TURBOCAD V1 WINDOWS



The most significant release of any CAD software this decade

5 EZ LANGUAGE VERSION 1



EZ Language V1 is the first & easy vocabulary pronunciation tutor for 7 different languages

6 LEONARDO THE INVENTOR



A multimedia exploration of the life works of Leonardo da Vinci. (40 30 glosses)

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EVERYTHING FOR YOUR PC - DELIVERED NATIONWIDE!

Smart & Friendly DVD ROM

Verbatim

Upgrade Kit

The 2nd generation of DVD-ROM drive has arrived!

NEW PRODUCT

The GD-2000 offers exceptional reliability and first class performance with both CD-ROM and DVD and DVD-ROM disc.

First-class DVD-ROM and CD-ROM performance

The GD-2000 features leading-edge technology that pushes performance to new heights: 2x speed (2.76 Mbytes/s) for DVD-ROM, and 20x max. speed (3.34 Mbytes/s, full CAV) for CD-ROM.

CD-RW (CD-E) compatibility

Capable of reading new CD-RW format, in addition to the other CD-ROM, CD-R and DVD-ROM formats already available or announced, the GD-2000 offers maximum compatibility.

ATAPI (Enhanced IDE)

Enhanced IDE, the most popular interface for both hard disks and CD-ROM drives, offers proven performance and reliability. With ATAPI PIO (Programmed I/O transfer) Mode-4 compatibility, the GD-2000 boasts data throughput that is more than sufficient for today's most demanding multimedia titles.

High Reliability

Hitachi is renowned for high reliability and several improvements will be even more reliable.

Features: Included in the kit:

- One Hitachi GD-2000 DVD-ROM Drive,
- One Quadrant International Cinemaster Card,
- Four DVD-ROM titles:
- Muppet Treasure Island - Activision
- Spycraft - The Great Game - Activision
- Daedalus Encounter - Mechadeus
- The Genius of Edison - The Learning Company

2nd Generation

\$899

Ver074 DVD ROM Upgrade Kit

2X CD Recording

Station CD-R 2006

FAST - Awesome value and ease of use!

Boasting 2X record (300 Kbytes/sec) and 6X read (900 Kbytes/sec) speed, this affordable CD-Recorder is bound to please both seasoned multimedia pros and first-time home users alike... especially those on a budget. The CD-R 2006 includes all the latest software to create CDs the way they were meant to... fast and trouble-free.

Bundled Software includes:
Supplied with PC and Mac software

• CD Consultant

• CDR Disc Jockey

[http:// www.smartandfriendly.com](http://www.smartandfriendly.com).

VER070 Smart and Friendly CD-R 2006 (Internal).....**\$669**

VER071 Smart and Friendly CD-R 2006 (External).....**\$829**

Quad-speed/CD-Recording

Station/CD-R 4006

FASTER - Breaking the speed barrier!

If creating CDs fast is your thing, then this speed demon will record a 650MB disc in just 17 minutes! Plus, thanks to its blazing 6X reading speed, you'll enjoy the latest software titles with flicker-free video, seamless animation and crystal-clear sound. Better yet, you'll access data from source discs in a heartbeat. Available in both internal and external models.

Bundled Software includes:
Supplied with PC and Mac software

• CD Consultant

• CDR Disc Jockey

[http:// www.smartandfriendly.com](http://www.smartandfriendly.com).

VER072 Smart and Friendly CD-R 4006 (Internal).....**\$1109**

VER073 Smart and Friendly CD-R 4006 (External)**\$1289**

VER043 CD DataLife 640 MB CD.....**\$4.50**

The Seinfeld CD-ROM!

6VA008



Only \$39.95

Nearly one hour of video clips, over 100 screen savers, planner and print shop!

For a limited time only.

Index

Category Page

Product Listing 2

Introduction 3

SOFTWARE

Microsoft 4-7

Hot Deals 8

PCs/Thinkpads 9

Business 10-19

Graphics 20-24

Utilities 25-40

PERIPHERALS

Networking 41-42

Multimedia 43-49

Storage 50-52

Inputs 52-53

Scanners 54-55

Printers 55-58

Modems 59-61

Specials 62

Leisure 63-64

SONY SRS-PC21

A light compact entry level model with a modern design.

Featuring Intelligent Base Boost, the SRS-PC21 automatically enhances bass sounds with no risk of distortion. High-quality listening at an affordable price.

- Intelligent Bass Boost (IBB) for automatic control of rich bass sound
- Active or passive use



SONY30 SRS-PC21**\$49**

SONY SRS-PC41

This speaker offers a stylish design with powerful IBB bass sound and a frequency response of 70 Hz to 30 kHz. An additional output jack offers extra bass for a sub-woofer that can be controlled from the SRS-PC41.

- Intelligent Bass Boost (IBB) for full resonant bass sound
- Dual input for audio mixing
- Audio output jack for sub-woofer



SONY31 SRS-PC41**\$105**

The SONY SRS-PC300D

For music connoisseurs who expect the best, the SRS-PC300D provides a big sound matched by rich, resonant bass. This is a dynamic three piece system offering a total output power of 25W.

The positioning is entirely variable and allows you to sense the sound coming from different directions - try mounting the smaller speakers on the monitor at ear level using the supplied adaptor and placing the sub-woofer beneath the desk. Game enthusiasts will enjoy multi-dimensional sound effects such as bombs exploding all around them!

Home Stereo Quality

The SRS-PC300D has two audio inputs and a function selector for mixing the two so you can match sound from games, music CDs software applications. It also features a variable bass boost control for enhancing its rich bass quality, making music listening as much a pleasure on your home stereo unit.

Features

- Dynamic three piece system for multi-directional sound effects.
- Exceptional output power plus variable bass boost control for rich, resonant bass.
- Two audio inputs, mixing function and headphone jack for easy output switching.



SONY32 SRS-PC300D.....**\$269**

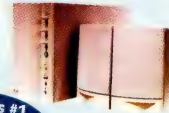
Labtec Speakers

Game Series LCS-3210 Amplified Computer Speakers

For the ultimate Multimedia Experience

Features:

- Greater bass output levels.
- Ideal matching of sub woofer to satellites - regardless of brand.
- Master volume buffered outputs >60 ohms impedance
- 13.3 cm Max-X high woofer & 680 gram magnet structure.
- 14 Watts RMS total into 4 ohms
- Optimised port bass extended response to 35Hz
- One year limited warranty



IBM012 LCS 3210 Amplified Computer Speakers.....**\$169**

Game Series LCS-2612 Amplified Computer Speakers

The ideal speaker system for enhanced CD-ROMs, games and music

With Spatializer technology the LCS 2612 Amplified Computer Speakers create vivid, expansive, and interactive three-dimensional surround-sound listening experience ideal for CD-ROMs, games and music.

- 20 watts (4w + 4w + 12w) into 4 ohms load with <10% THD both channels driven
- Frequency response : 40 Hz-20kHz
- Magnetically shielded to protect monitor, hard drive and disk storage
- 13.3 cm Max-X high excursion subwoofer
- 7.6 cm Max-X high excursion driver
- One touch mute button for enhanced control
- One year limited warranty



LAB011 LCS 2612 Amplified Computer Speakers**\$199**

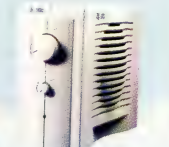
Labtec LCS-2408 Universal Subwoofer

Sound seems to come from all around you

The first universally compatible multimedia subwoofer that is compatible with virtually all amplified satellite speakers on the market today - works with or without a subwoofer output jack.

Features:

- Suppression circuit provides bass output levels without distortion.
- Ideal matching of sub woofer to satellites - regardless of brand.
- Will drive all amplified satellite speakers with 60 ohms or higher impedance
- 13.3 cm Max-X high excursion woofer with 6 layer voice coil and massive 680 gram magnet structure.
- 14 Watts RMS total into 4 ohms
- One year limited warranty



LAB010 Universal Subwoofer**\$109**

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*See page 3 for Price Pledge

MULTI-MEDIA

AI Gotcha 2 Portable Video Capture

Take snapshots of your favourite images from Camcorder, VCR, or other Video source in 16.7 million colours into your PC. You can use photos for multimedia presentations, web page publishing, disk-based catalogues personal photo albums, image database, digital greeting cards, newsletters, e-mails and much more. This is a simple plug-in (parallel port) and play device providing a high quality portable capture solution. By connecting to a video source, whether composite or Y/C, an extremely high quality image can be captured (1600 x 1200 dpi) into any of the supported graphic file formats.

Features

- AiGotcha! Real-time image capture software
- Internet audio postcard
- Parallel port extension cable
- AiGotcha hardware (NTSC/PAL)
- Video Craft Multi-Media suite of special effects
- Pass through printer connections



Free Headset & 3D Game

\$369

ASS011 AI Gotcha

Pocket Scan Converter (PSC 1106)

Your business presentations on the big screen.

Using the Pocket Scan Converter in conjunction with your notebook computer (or PC), any presentation can be displayed on a TV or recorded onto video tape, making the Pocket Scan Converter ideal for business, education and training applications. This compact device simply plug into your notebook/PC and the other end into a TV/Video to put your presentations onto the big screen. And when the work is done, play computer games on your TV. Designed with flicker reduction circuitry and S-VHS support, the Pocket Scan Converter produces extremely vivid, high quality images with up to 16.8 million colours.



Free 3D Game

\$209

ASS001 PSC 1106

WaveWatcher TV PCI Card

Video capture (to 30 f.a.s.) and TV tuner PCI card with remote control

The WaveWatcher provides resolution up to 768x560 at 30 fps or single frame / display mode up to 1280x1024 in 24 bit true colour. This simple to use Plug-n-play installation makes getting started a snap. The WaveWatcher PCI bus, eliminating the need for feature connector as well as the VGA looping cable.

A MultiMedia Studio on Your Computer

Capture full motion video direct from your TV, camcorder of VCR with CD-quality sound. Includes Media Studio Pro 2.5 professional editing and special effects software & allows the creation of full motion multi-media clips with up to 101 simultaneous video and audio tracks.

125 Channel TV Turner

Featuring 125 Channel TV Turner with Background viewing. Simply plug your T.V. antenna input directly into your computer and watch your favourite shows and movie on UHF or VHF while running other applications.

Video Conference Enabled

Works with your video camera, modem and video conferencing software for improved image resolution and faster frame rates. Includes Unled's MediaStudio 2.5 Video Editing Software.



Free Headset & 3D Game

\$359

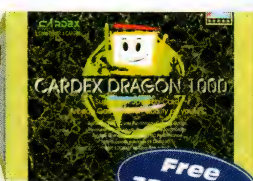
ASS006 WaveWatcher (PCI Card only)

Cardex Dragon 2000 Super Fast 3D Turbo Card

Transforms your PC into the ultimate gaming station with revolutionary 3D interactive real time technology, giving you arcade game station quality 3D performance that fully supports Windows 95 Direct 3D. Comes with 4Mb EDORAM for ultra fast action.

Features

- Fully supports all PC97 3D Standard Features
- Revolutionary 3D Interactive Real-Time Technology
- The easiest way to turn your PC into the ultimate gaming station
- Arcade game quality for an at-home price!
- Cyber speed 3D game



Free 3D Game

\$545

ASS015 Cardex Dragon 2000

PC-DVD Encore DXR2

Creative Labs, the creator of Sound Blaster and the market leader in multimedia upgrade kits once again leads the world in bringing you the future generation of digital home-entertainment to your PC and living room.

With Creative PC-DVD Encore Dxr2, you get technologies and experiences totally unprecedented on your PC today, such as vibrant digital imagery of MPEG-2 video that's uniquely enhanced for high-definition and smoothness, the sparkling clarity and room-shaking thunder of Dolby Digital (AC-3) audio with cinematic surround-sound, and massive high-speed storage. It's as if the future is already here.

What is DXR2? PC-DVD Encore Dxr2 is the DVD upgrade kit for your PC, which includes a second-generation PC-DVD ROM drive combined with the PCI-based Dxr2 card that includes state-of-the-art picture enhancement technology and MPEG-2/Dolby Digital decoding. With PC-DVD Encore, you get 7 futuristic entertainment solutions for an incredibly low price.

Features

- DVD Player for your TV - Plays on big TV and Video Screen
- DVD Player for your PC - Enjoy an avalanche of Hollywood movies, games and entertainment like never before
- Blazing 20x Speed CD-ROM Drive - Data access and transfer at a super fast 100ms
- 2nd-Generation, 2x Speed DVD-ROM Drive - Double the speed of the competition
- Stores up to 17 Gigabytes of data. No more CD-R incompatibility plaguing all first-generation DVD-ROM drives.
- VideoCD (H/W MPEG-1 Player) - Enjoy the thousands of entertainment titles available
- Dxr2, State-of-the-Art Picture Enhancement
- In a class with expensive "line doublers," our DynamicXtended Resolution (Dxr2) video enhancer performs as well, if not better, than other professional line doubling systems costing thousands of dollars.
- Dolby Digital AC-3 Audio To wrap up the awesome features
- PC-DVD Encore comes with Dolby Digital (AC-3) audio output. You can enjoy the high-fidelity acoustic clarity of Dolby Digital audio, down-mixed to 2 channels on your PC sound system or you can have a full-blown, room-shaking, theatre-like experience of a 6-speaker (5.1 channel) surround system with an optional low-cost consumer Dolby Digital receiver.



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Stock Code: CRE040

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STORAGE

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EVERYTHING FOR YOUR PC - DELIVERED NATIONWIDE!

ZIP An affordable personal storage solution in one!

Expand your hard drive without the limits
Increase your storage quickly, easily and economically -

as you need it. With 100Mb Zip Disks, you can add as many disks as you need and if you're using compression software, you can keep up to 200MB of your stuff on a single Zip drive.

The newest smallest, most portable drive. The best way to move your information - Zip drive and disks are small, light and convenient. Zip drive weighs about 450g and fits easily in your hand, bag or briefcase.



- Expand your hard drive without the limits (100MB at a time)
- Take it with you (Zip drive and disks are portable)
- Backup your hard drive (fast and easy)

IM022	Zip Drive External (Parallel port)	\$259
IM020	Zip Drive External (SCSI port)	\$259
AUP157	Zip Drive Internal 3.5 (Includes SCSI Controller Card)	\$259

JAZ Jaz is the perfect choice for hard drive upgrades!

An ideal answer for multimedia
Jaz drives and disks are the ideal solution for

storing, transporting and playing multimedia applications. You can pack up to 1 gigabyte on each disk, and there is no limit to the number of disks you can use. The Jaz drive's speedy access times and rapid transfer rate mean you can quickly and easily move files around.

And the Jaz drive can handle even the most demanding usages, including full-screen full motion video.



- Faster than most hard drives (Works as fast as you do)
- Provides 1GB of disk space on each compact cartridge (Enough to back up your entire hard drive)
- Portable- goes where you go (makes transporting information easier)

IM023	JAZ drive (SCSI External)	\$699
IM021	JAZ drive (SCSI Internal)	\$509

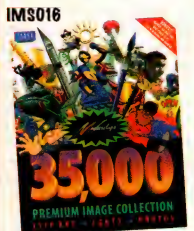
ZIP & JAZZ DISKS



AUP160	3x ZIP 100Mb PC Disks	\$79
IM030	10x ZIP 100Mb PC Disks	\$219
AUP161	3x ZIP 100Mb Mac Disks	\$199
IM044	6x ZIP 100Mb PC Disks	\$149
IM032	3x JAZ Media PC Disks	\$449
AUP162	3x JAZ Media Mac Disks	\$449
AUP163	JAZ Traveller	\$69

(Transfers data from a Mac to a PC)

IMSI Masterclip \$35,000



Only \$19.95

Spend over \$50 & Buy Masterclips 35,000 (CD's Only) - For Only \$19.95, a saving of \$25!

For a limited time only.

Index

Category	Page
Product Listing	2
Introduction	3
SOFTWARE	
Microsoft	4-7
Hot Deals	8
PCs/Thinkpads	9
Business	10-19
Graphics	20-24
Utilities	25-40
PERIPHERALS	
Networking	41-42
Multimedia	43-49
Storage	50-52
Inputs	52-53
Scanners	54-55
Printers	55-58
Modems	59-61
Specials	62
Leisure	63-64

SONY StorStation

Ultra-Compact Ultra-Fast Ultra-Easy
The Sony StorStation Tape Drive, with a capacity for up to 2.0GB, it's a great way to backup your hard drive.

The StorStation is easy to install, taking only minutes and connects to the parallel port for convenience. It is also small, light and very portable. The StorStation lets you protect the contents of your hard drive just by clicking an icon. You can also schedule backups, so even if you forget, the StorStation does not. You can also perform Backup in the background. This function lets you continue to use your computer, as your hard drive is being protected. Restoring is just as easy with a simple click, as with the copy function from tape-to-disk and disk-to-tape.



SONY

- Features
- 2.0GB Capacity (with compression)
 - Parallel Interface Cable Included
 - One-Step Backup
 - Easy installation
 - Includes powerful software for DOS Win 3.1 & 95
 - One QW2GB Data Cartridge

Sony QW2GB data cartridges

Sony QW2GB data cartridges, the reliable and versatile solution for data backup. With a maximum of 2GB capacity, compatible with Sony Storestation and Ditto Drives.

SONY20	Sony QW 2GB data Cartridge (5 pack)	\$209
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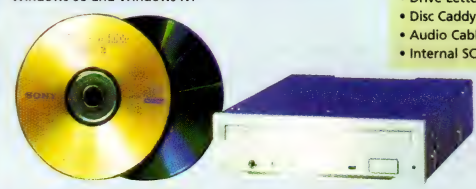
Stock Code: SONY21
\$325

SONY CD-ROM Recorder

Spressa Recordable CD-ROM (CDOR) Drives - 2x Write/6x Read

Create your own CD-ROM discs or back-up/archive with your data with the Sony Spressa, Recordable CD-ROM Drive. With the Spressa, creating CD's is easy, efficient and inexpensive. Whether it's a document, database, image file, multimedia presentation or other information, the Spressa provide users the capacity to retain, distribute and access data. Bundled with the Spressa is CD Creator Mastering Software, enabling users to enjoy ease of use and powerful functions. The robust features of the CD Creator include Disc Wizard for assisting the disc creation process, a jewel case editor for creating customised inserts, video CD and Photo CD creation capabilities, CD duplication services and studio (WAV) file editing capabilities. Spressa CD-R drives are compatible with Windows 3.x, Windows 95 and Windows NT

- Supplied Accessories:
- One CD-R Disc
 - Drive Letter/Number Labels
 - Disc Caddy
 - Audio Cable
 - Internal SCSI Cable



SONY

SONY22	Sony Spressa External	\$1209
SONY23	Sony Spressa Internal	\$969

Sony Recordable CD media

Sony CD-R media has a large 650MB recording capacity for digital data: computer, audio and digital video. These Write-once CDs are extremely reliable and ideal for a wide range of applications.

SONY24	Sony CD-R media (10 pack dual case)	\$109
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STORAGE

IF YOU CAN FIND IT CHEAPER CALL US - WE WON'T BE BEATEN! *See page 3 for Price Pledge

SyJet 1.5GB Bigger, Faster and Better

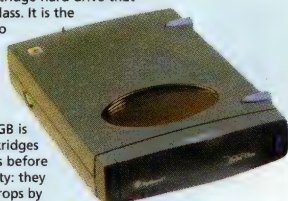
SyJet is designed to offer maximum performance flexibility and reliability, at tremendous value.

SyJet 1.5 GB is a high-performance removable cartridge hard drive that boasts the highest capacity of any product in its class. It is the logical choice for professional musicians and audio mixers, digital video editors, graphic designers and desktop publishers, multimedia developers, webmasters, presenters, road warriors, engineers, gamers who want screaming performance, and countless others.

Like all SyQuest removable hard drives, SyJet 1.5 GB is built in Class 100 clean rooms. Each drive and cartridges are shock-resistant and must pass drop shock tests before qualification. Cartridges are designed for durability: they are designed to survive falls from desktops and drops by users.

SyJet Means SPEED

SyJet's unique design provides a high-performance minimum sustained read/write data transfer rate of 3.7MB/sec. - fast enough to sustain full motion video without dropping frames - while approaching a maximum data transfer rate of 7MB/sec. The SCSI burst is 10MB/sec. An EDIE (PIO Mode 4) version allows a burst up to 16.6MB/sec, similar to the rate attained by today's IDE-based fixed hard drives.



What the press are saying

"SyJet: A Better Way to Store your Stuff" - Macworld, May 97.
"Sleek in looks and fleet in performance, the SyJet 1.5GB matches or exceeds the performance of the Iomega Jaz drive and offers more capacity" - Windows, April 97.

SYQ020 Internal SCSI Kit 1.5GB (PC)	\$569
SYQ021 Internal SCSI Kit 1.5GB (Mac)	\$569
SYQ022 External SCSI Kit 1.5GB (PC)	\$759
SYQ023 External SCSI Kit 1.5GB (Mac)	\$759
SYQ024 Internal EIDE Kit 1.5GB (PC)	\$569
SYQ025 External Parallel Port Kit 1.5GB	\$759
SYQ026 1.5MB Media for SyJet - PC	\$219
SYQ027 1.5MB Media for SyJet - Mac	\$219

EZFlyer 230MB External SCSI & Parallel Port Internal EIDE

The world of personal computer storage is changing, fast. Files are huge and getting bigger. The floppy is no longer big enough and the fixed hard drive is just that fixed, and difficult to upgrade.

The EZFlyer 230 from SyQuest solves the storage problems of today, better than any other product. It combines the flexibility of a data cartridge three and a half inches square with the blazing speed of hard drive technology.



Instant access to files. Random access. Bootable.

The EZFlyer 230 works just like a fixed hard drive. So quickly referring to, updating, and backing up all sizes of files on a continual basis is a breeze.

Super fast hard drive

The EZFlyer 230 is a hard drive; one that never fills up. The EZFlyer 230 is the only removable cartridge in its price range. It uses the same proven components as fixed hard drives and provides speeds significantly faster than other technology.

Endless Capacity

It's amazing how fast your fixed drive fills up. With the EZFlyer 230, when you need more space, you simply add more cartridges.

What the press are saying

"High Flyer Offers EZ Data Storage"
"The EZFlyer Really soars"
"Installation was a snap"
"The EZFlyer is light enough to be portable, rugged enough for constant use and quit even in close quarters" - Windows, October 96.
"The EZFlyer 230 is a dream to use - it simply appears as another hard disk drive." - Home Office Computing, November 96.



SYQ028 External SCSI Kit (PC)	\$299
SYQ029 External SCSI Kit (Mac)	\$299
SYQ030 Internal EIDE Kit (mount in 5.25")	\$299
SYQ031 External Parallel Port Kit	\$299
SYQ032 230MB Media for EZFlyer (PC)	\$55
SYQ033 230MB Media for EZFlyer (Mac)	\$55

Western Digital CAVIAR Hard Drives



Western Digital

Western Digital CAVIAR hard drives are customer-focused to bring you affordable high capacity storage solutions. Each enhanced IDE (EIDE) hard drive comes with a three year warranty. Each is fully tested to ensure compatibility, reliability, and exceptional quality. Western Digital Hard Drive Kits provide everything you'll need to get your new drive up and

running: hard drive, mounting hardware, cable, and detailed instructions. Also included is free installation software designed to work with Windows 32-bit disk access, Windows 95, Windows 3.1x, Windows NT, OS/2 2.1x, and OS/2 Warp. This software successfully overcomes two potential system BIOS limitations, and makes installation a breeze.

Physical Specifications

Model	Caviar 2.1	Caviar 2.5	Caniar 3.1	Caviar 4.0	Caviar 5.1
Interface	40-pin EDIE	40-pin EDIE	40-pin EDIE	40-pin EDIE	40-pin EDIE
Formatted Capacity	2111.8MB	2559.8MB	3166.7MB	4000.7MB	5163.5MB
Actuator Type	Voice Coil	Voice Coil	Voice Coil	Voice Coil	Voice Coil
Bytes per Sector	512	512	512	512	512
User Sectors per Drive	4,124,736	4,999,680	6,185,088	7,814,016	10,085,040
Servo Type	Embedded	Embedded	Embedded	Embedded	Embedded
ECC - Reed Solomon	Yes	Yes	Yes	Yes	Yes
Dedicated Landing Zone	Yes	Yes	Yes	Yes	Yes
Actuator Latch/Auto Park	Yes	Yes	Yes	Yes	Yes
Recommended Setup	4092x16x63	4960x 16x63	6136x16x63	7752x16x63	10672x16x63

Performance Specifications

	4.0GB	All Other Drives
Seek Times:		
- Average/Read Seek	11ms	Sub 12ms
- Track to Track	3.0ms	3.0ms
- Full Stroke Seek	21ms	22ms
Average Latency	5.8ms	5.76ms
Rotational Speed	5200RPM	%200RPM
Data Transfer Rate:		
- PIO burst	16.6MB/s	16.6MB/s
- DMA	16.6MB/s	16.6MB/s
Read Cache	Adaptive Segmented	Adaptive Segmented
Write Cache	Yes	Yes
Buffer	256KB	128KB
Start/Stop Cycles	40,000 min	40,000 min



WE5050 2GB Drive Kit	\$359
WE5051 3.2GB Drive Kit	\$429
WE5052 4.3GB Drive Kit	\$469
WE5053 6.1GB Drive Kit	\$699
WE5054 6.4GB Drive Kit	\$719

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- 4 TURBOCAD V1 WINDOWS**
The most significant release of any CAD software this decade.
- 5 EZ LANGUAGE VERSION 1**
EZ Language V1 is the fun & easy vocabulary pronunciation tutor for 7 different languages.
- 6 LEONARDO THE INVENTOR**
A multimedia exploration of the life works of Leonardo da Vinci. (No 3D glasses)

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STORAGE

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SuperDisk

The Future of Data Storage



The Imation SuperDisk diskette is a 120MB diskette based on the high-capacity LS-120 diskette technology developed by Imation.

SuperDisk LS-120 Drive

This is the only high-capacity bootable drive solution that also reads and writes standard 1.44MB diskettes, of which there are billions in use today around the world.

Backwards Compatible

The SuperDisk LS-120 drives are backward compatible so that they can read and write all 3.5" diskettes both in 1.44MB and 720KB formats. This unique advantage means that all of the important information and data currently stored on those billions of 3.5" diskettes in use world-wide can still be accessed.

High Speed

SuperDisk LS-120 drives spin at high speed and can generate substantially faster data transfer rates. The transfer rate is up to five times faster than conventional diskette drives. Even when using conventional diskettes and are up to three times as fast as conventional drives.

Features

- Accepts all SuperDisk LS-120 and standard 3.5" floppy diskettes
- Moves files up to five times faster than conventional drives
- Even faster with Performance Accelerator software - faster than a parallel Zip Drive
- Just plug the SuperDisk Driver into the printer port and run the installation software.

IMA003 SuperDisk LS-120 Drive..... **\$275**

SuperDisk

LS-120 Diskettes



The SuperDisk LS-120 diskette looks similar in size and shape to the standard 3.5" diskette, and is just as simple to use 120MB capacity.

Large 120MB Capacity

With 120MB of usable capacity, a SuperDisk features 83 times more capacity than a conventional 1.44MB diskette. That's enough storage capacity to hold a blueprint for 30-story building ... or 100 spreadsheets ... or 300 word processing documents or a complete interactive presentation on one SuperDisk.

SuperDisk diskettes are 20 megabytes bigger than Zip disks with a lower cost per megabyte.

Features

- 120MB storage capacity
- Same size, shape, functionality as standard diskettes
- Look and feel just like standard diskettes
- More storage for your money
- Holds up to 83 standard diskettes

IMA004 SuperDisk LS-120 Diskette (3-Pack) **\$79**

IMA005 SuperDisk LS-120 Diskette (5-Pack) **\$119**

IMA006 SuperDisk LS-120 Diskette (10-Pack) **\$225**

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HIL001



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Index

Category Page
Product Listing 2
Introduction 3

SOFTWARE

Microsoft 4-7
Hot Deals 8
PCs/Thinkpads 9
Business 10-19
Graphics 20-24
Utilities 25-40

PERIPHERALS

Networking 41-42
Multimedia 43-49
Storage 50-52
Inputs 52-53
Scanners 54-55
Printers 55-58
Modems 59-61
Specials 62
Leisure 63-64

HYUNDAI

DeluxScan Monitors

DeluxScan Monitors

Available in sizes from 14" to a massive 21" at highly competitive prices the Hyundai DeluxScan Monitor has all the features you would expect from one of the most innovative and successful electronics companies in the world. Manufactured to the ISO 9001 standard, all Hyundai Monitors are extremely energy efficient and comply with EPA Energy Star/ VESA DPMS power saving requirements. Such features allow Hyundai to back their Monitors with an exclusive three year on-site Australia & New Zealand-wide warranty* service.

Ergonomical front panel controls, higher refresh rates, flicker-free images and low emissions are standard on all Hyundai Monitors. Higher resolutions (up to 1280 x 1024) give you amazing clarity for every possible application, from Windows to high end graphics and imaging. So whether you want to design a complex 3D model or simply play, the Hyundai DeluxScan monitor is the one for you!

Features

- Three year on-site warranty available in Australia and New Zealand*
- Plug and play ready
- On screen digital displays
- Compliance with radiation & VESA DPMS standards
- Low-power usage
- Amazing resolution



free 3 YEAR Onsite Warranty

HYA001 Hyundai 14" Monitor **\$319**

HYA002 Hyundai 15" Monitor **\$459**

HYA003 Hyundai 17" Monitor **\$855**

HYA004 Hyundai 21" Monitor **\$2399**

All prices INCLUDE sales tax. Prices subject to change, see page 3 for terms & conditions.

Kodak DC210

Capture exceptional digital pictures with ease

The Kodak Digital Science DC210 Zoom Camera gives you the power to do it. Quickly. Easily. Affordably. With a 2X zoom lens so you can get closer to the action. And megapixel technology, to give your pictures vivid colours and dazzling detail. Plus with Kodak Digital Science Picture Easy Software 2.0 you'll have the power to download, manipulate and share images. Check it out. It's got everything you need to Take Pictures.



KOD005 Kodak DC210 Digital Camera **\$799**

Kodak DC50

Zoom Lens - 3:1 zoom capability that gives you a focal length of up to 37mm. The flash offers three modes: automatic, on or off. Up to a 14' range. Slide cover doubles as your power switch, open and camera is ready to take pictures.

Internal memory - store up to 22 "good", 11 "better" and 7 "best" quality pictures for up to 1 year.

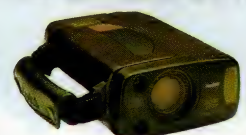


KOD003 Kodak DC50 Digital Camera **\$825**

AUP120 DC-50 PCMCIA Card **\$259**

Kodak DC120 zoom

Capture a wide shot, then zoom in for the detail with a 3:1 zoom lens - and the LCD display lets you know instantly what you have shot. And with an erase feature you know you'll get the shot you want in rich precise colour with high res 1.2M pixels 1280 x 950. Camera also features 2Mb of internal storage for up to 20 pictures and supports removable 2mb and 10Mb picture cards.



KOD006 Kodak DC120 Digital Camera **\$1299**



52

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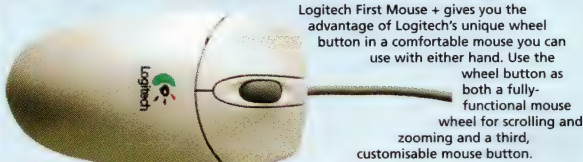
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IF YOU CAN FIND IT CHEAPER CALL US - WE WON'T BE BEATEN!*

*See page 3
for Price Pledge

Logitech First Mouse+

Your best value in a zooming/scrolling mouse



Logitech First Mouse+ gives you the advantage of Logitech's unique wheel button in a comfortable mouse you can use with either hand. Use the wheel button as both a fully-functional mouse wheel for scrolling and zooming and a third, customisable mouse button.

The unique wheel button does more. While most mouse wheels allow you to scroll and zoom in Office 97, Logitech's wheel also gives you the convenience of scrolling in all your Windows '95 applications and on the Internet as well. This wheel is designed to give you easy, precise movement. It's also a mouse button, which you can easily customise, with a one-click command for extra productivity.

Scroll in Windows '95 applications. When you use the wheel to scroll in Windows '95 applications, you get full up and down scrolling instantly at the speed that's most convenient for you, without having to move the mouse or click on the scroll bar. First Mouse+ also gives you the ability to AutoScroll allowing you to scroll diagonally or in any other direction. Click the button assigned to AutoScroll, then move the mouse to scroll freely through documents, such as spreadsheets, which are larger than the screen.

Features:

- Easier programmability and control panel access
- 1 year warranty

LOG060 First Mouse+

\$48



MouseMan

Logitech MouseMan offers you an innovative shape that was designed with humans in mind.

Textured grips make this mouse easy to hold and easy to use. Customise the four buttons with one-click commands to work faster and easier. Three of the buttons are on top and fall under your fingers. There's also a handy thumb button on the side.

Scroll in Office 97 and Windows '95. Use the MouseMan thumb button to scroll in Office 97, any Windows 95 application, and on the Internet. Simply click the button and move your mouse to achieve left/right, up/down can diagonal scrolling. Adjust scrolling speed by moving the mouse more quickly or slowly.

Customise the buttons with the click commands. Award-winning MouseWare software makes it simple to customise MouseMan buttons with only one-click commands. For example in Windows 3.1 and Windows 95, the middle button is assigned to double click. Just click the button once and it double clicks for you. Or, customise buttons with cut, paste, page up, page down, task list, or a long list of other shortcuts. It's simple.

Features:

- 3-year warranty
- Universal scroll and Autoscroll, and zoom in Microsoft Office and Microsoft Explorer
- New innovative shape
- MouseWare 7.5
- Universal scroll and Autoscroll in all Windows 95 applications

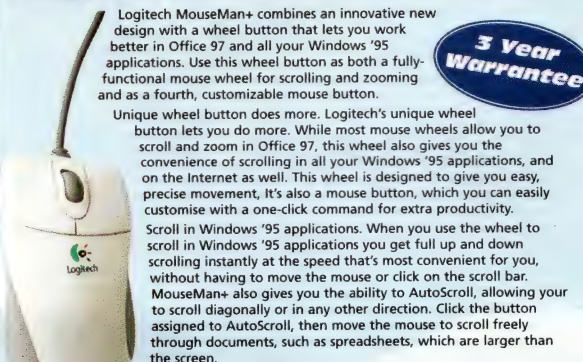
LOG061 MouseMan

\$79



Logitech MouseMan+

Logitech MouseMan+ combines an innovative new design with a wheel button that lets you work better in Office 97 and all your Windows '95 applications. Use this wheel button as both a fully-functional mouse wheel for scrolling and zooming and as a fourth, customizable mouse button.



3 Year Warranty

Unique wheel button does more. Logitech's unique wheel button lets you do more. While most mouse wheels allow you to scroll and zoom in Office 97, this wheel also gives you the convenience of scrolling in all your Windows '95 applications, and on the Internet as well. This wheel is designed to give you easy, precise movement. It's also a mouse button, which you can easily customise with a one-click command for extra productivity.

Scroll in Windows '95 applications. When you use the wheel to scroll in Windows '95 applications you get full up and down scrolling instantly at the speed that's most convenient for you, without having to move the mouse or click on the scroll bar. MouseMan+ also gives you the ability to AutoScroll, allowing you to scroll diagonally or in any other direction. Click the button assigned to AutoScroll, then move the mouse to scroll freely through documents, such as spreadsheets, which are larger than the screen.

One-handed zooming in Office 97. Use the wheel and MouseMan+ thumb button for easy one-handed zooming in Office 97. Just click the thumb button, and roll the wheel to zoom in or out.

You never have to touch your keyboard, and you can keep your eyes on your work.

LOG062 MouseMan+

\$92



DEXXA Flatbed Scanner 4800 - 30 bit colour, for Windows 95

- The first truly compact 4800 dpi scanner
- Easy to install and use, plugs into the parallel port
- Scan both images and text, then fax, copy and e-mail
- Save time through fast scanning speed, single-pass, and no worm-up time.



NEW PRODUCT

Best Value Scanner

Dexxa Flatbed Scanner 4800 is the ideal partner to help you master the art of scanning promptly and easily. Scan pictures and use them to liven up all your documents, from business reports to original greeting cards and calendars. Can text and edit it just like keyboard text. You can even scan thick books by raising the covers hinges. The single scanning button gives you complete control of the task: it lights up to indicate when power is on and flashes during the scanning process. This practical, fast and compact scanner enables you to produce professional standard results.

Additional features

- 300 x 600 dpi optical resolution (4800 x 4800 dpi enhanced), 30-bit colour scanning
- Touch up and personalise your image with Adobe PhotoDeluxe
- Forget retyping: Xerox TextBridge OCR allows you to edit scanned text
- Parallel port connection with pass-through; no need to open your computer
- One year Guarantee

DEX001 Dexxa Scanner 4800

\$189



Logitech Wingman Extreme Digital and X-Wing V's Tie-Fighter Bundle

Free Games Bundle

Logitech's WingMan Extreme Digital joystick provides speed and precision. It features an award winning sculpted grip, reinforced trigger and four-way hat switch, rubber coated buttons, radical throttle for intuitive speed control, and a super heavy base with two extra buttons for extra weapons control in Windows 95 games. An easy to use control panel lets you customise the buttons for Windows 95 games.

Star Wars: X-Wing Vs Tie-Fighter the academy version by Lucas Arts is a single and multi-player space combat simulation game. Now you can prove your mettle in challenging real-time dogfights of 2 to 8 players over a modem or local network. It features 14 combat training missions in 9 meticulously enhanced Star Wars Starfighters with or against your friends. Or fly solo to enhance your skills. All 14 training combat missions can be played solo; 7 of which can be played multi-player and you can fly either for the Empire or the Rebellion, alone or with others, cooperatively or competitively.



LOG080 WingMan Extreme Digital & X-Wing Vs Tie-Fighter

\$89⁹⁵



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SCANNERS

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MICROTEK High-Tech Scanning

All Microtek Scanners Offer

- ScanWizard for Windows 3.1, 95, NT & Mac
- OmniPage LE OCR for Windows and Mac

- Top quality Image Editing software

- Fast 1 Pass Colour Scans using a true colour CCD.

- "Simple SCSI" or genuine Adaptec SCSI card. 3ft cable.

- SCAN/COPY Utility (Scan to Fax card, printer or disk).

- Optional document feeder or transparency adaptor.

- Most software and drivers are supplied on CD

MICROTEK 35T Plus

- High-speed, high-resolution dedicated 35mm Slide Scanner
- 3,900 x 1,950 DPI Optical
- 3,900 DPI Interpolated
- Scans both negatives and positives.
- Scans strips or mounted slides.
- Imaging Magazine Editor's Choice.



35mm slides are far more difficult to scan than standard photos. The 35T Plus is designed to scan purely 35mm slides, delivering not only the higher resolution required for slides, but also by eliminating the use of mirrors and glass, it delivers much sharper images.

PRO504 Microtek 35T Plus.....

\$1049

ScanWizard

Free with Microtek Scanners

According to PC MAGAZINE "arguably the best in the business", ScanWizard gives you complete control over your MICROTEK scanner and the way you want your images scanned. To scan an image, you first select colour, greyscale or line-art output. A live preview then shows you what is on the scanner's flatbed so you can select 1 or more images. You can of course simply use default automatic settings and by clicking on SCAN effortlessly obtain a top quality scan which will be very very close to the original!

With ScanWizard, matching the quality of your original image is not a challenge, simply a starting point. Why not make the image look better than the original? Based upon what you see on the screen, you can apply at time of scanning a host of image enhancements and filters. You may prefer a softer or sharper looking image. By boosting the colour saturation, you may want to give your pictures that "travel brochure look". You are in control!



Each time you apply a filter you can see the result on the screen, thanks to ScanWizard's Live Preview which shows you before and after images. This makes ScanWizard more fun, more powerful and easier to use than other scanning software.

For the advanced user, ScanWizard also includes a host of features like batch scanning, de-screening, exposure control, curves and levels, zoom preview and much more!

SCAN / COPY Utility

Quick-panel let's you scan directly to your existing printer, fax card or disk file. For Windows 3.11/95. FREE with all MICROTEK Scanners.



Transparency Media Adaptor

The Transparent Media Adaptor (TMA) lets you scan 35 mm slides and photographic transparencies up to 8x10". Very easy-to-install (clips on; no screws!), it simply replaces the scanner's lid

Adobe Photoshop 4

CD version. Special price if ordered with a MICROTEK scanner: **\$259**

Automatic Document Feeder

For unattended scanning in line-art mode for use with O.C.R. software. Simply replaces the scanner's normal lid.

MICROTEK E3

- 600 x 300 DPI Optical
- 4,800 DPI Interpolated
- A4+ Size (8.3 x 13")
- Windows Sources BEST Value
- Brighter, clearer images than other SOHO scanners



The MICROTEK E3 is priced for the SOHO market yet still offers an image quality in line with much more expensive scanners. It also offers the same high level ScanWizard scanning module as the rest of the MICROTEK range, setting it apart from other SOHO scanners in terms of features and ease of use.

PRO501 Microtek E3

\$349

MICROTEK E6

The new standard for affordable high quality Scanning

- 1200 x 600 DPI Optical
- 9,600 DPI Interpolated
- A4+ Size (8.3 x 13")
- Captures 4 times the detail of entry level "600 dpi" scanners.
- "Everything you could ask for in a high resolution scanner".
- PC WORLD Editor's Choice



The MICROTEK E6 offers a slightly sharper image and improved shadow detail compared to the E3. It also captures 4 times the level of detail compared to entry level scanners, which makes it an ideal choice for getting the best possible results when scanning logos, small text or if you want to get the most out of your pictures. It includes a full CD edition of PhotolImpact, probably the best software for preparing web images and the easiest to use for non-professional users.

PRO502 Microtek E6

\$699

ScanMaker3

The best Quality Flat Bed Scanner

- 36 Bit Colour (1 pass)
- 1,200 x 600 DPI Optical
- 9,600 DPI Interpolated
- A4+ Size (8.3 x 14")
- Best optical quality. The professional choice
- PC MAGAZINE Editor's Choice.



The Scanmaker 3 features true 36 bit processing and 36 bit colour correction, super fast processing at high resolutions, very low noise electronics, plus a higher quality lens and CCD compared to normal scanners. The result: a professional scanner capable of capturing ultra-fine detail from logos, maximum clarity and sharpness from photos. When used with a transparency option, it provides an impressive 3.4 dynamic range, which means it captures more shadow detail than any other flatbed scanner anywhere near this price range. It's no wonder that the Scanmaker 3 is used throughout Australia by professional users and has been acclaimed by publications like publish, PC Magazine, PC world and Byte.

PRO503 ScanMaker3

\$2099

PRO506 TMA for MICROTEK E3 or E6..... **\$549**

PRO509 TMA for ScanMaker 3

PRO508 Photoshop 4 with Microtek E6, 35T, or SM3..... **\$259**

PRO510 Automatic Document Feeder E3/E6/SM3

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Index

Category	Page
Product Listing	2
Introduction	3
SOFTWARE	
Microsoft	4-7
Hot Deals	8
PCs/Thinkpads	9
Business	10-19
Graphics	20-24
Utilities	25-40
PERIPHERALS	
Networking	41-42
Multimedia	43-49
Storage	50-52
Inputs	52-53
Scanners	54-55
Printers	55-58
Modems	59-61
Specials	62
Leisure	63-64



54

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PRINTERS

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*See page 3 for Price Pledge

EPSON Stylus Color 300

True
4 Colour
Prints

EPSON Stylus Color 400

Stunning
Quality

EPSON Stylus Color 600

1440dpi
Photo real
output

EPSON Stylus Color 800

Ultra Fast
Colour



The new EPSON Stylus Colour 300 offers true, four colour printing at a price that virtually everyone can afford. With the superb detail and quality of EPSON'S PerfectPicture Imaging System, and a high-resolution 720 dpi Micro Piezo print head, it delivers photo-quality colour images that will take your breath away.

- 720 dpi Micro Piezo printing
- Affordable 4 Colour Printing
- Crisp black text
- Fast Set-up & Easy-to-use software
- Photo-quality printouts - even on plain paper
- Epson Answers CD-ROM included with every printer provides easy to follow instructions for day to day printing tasks. The Epson Answers CD-ROM support Windows 3.1x and Windows 95 operating systems only
- Compatibility with a variety of image processing software means you can create colourful cards, calendars and more

NB * The page per minute print speeds are a guide only. Actual print speed may vary under different conditions

EP5138
Epson Stylus
Color 300. **\$249**



The Epson Stylus Color 400 is a high quality inkjet printer providing 720 x 720 dpi photo-real output with the addition of some new and exciting enhancements. It is the ideal printer to provide superb 720 dpi results for the home user for both business and personal documents, on all types of paper including plain.

- Up to 720 x 720 dpi high resolution printing in black and white and colour - even on plain paper
- Fast print speeds up to 4ppm* in Monochrome and 3ppm* in colour
- Photo quality output as standard - no additional option required
- Easy-to-use printer driver with EPSON answers On-Line manual CD-ROM
- Exclusively for Windows only, using EPSON printer driver technology
- The new standard in personal printing performance for home, home office and small business.
- Perfect for greetings cards, calendars, letterheads, reports, presentations, resumes, images and correspondence

NB * The page per minute print speeds are a guide only. Actual print speed may vary under different conditions

EP5134
Epson Stylus
Color 400. **\$359**



The Epson Stylus Color 600 is a high quality inkjet printer providing 1440dpi photo-real output, ideal for in-house desktop publishing and business and personal documents on all types of paper, including plain. The Stylus Color 600 features Epson's new Perfect Picture Imaging System, including MicroPiezo Technology for small accurate inkdots and AcuPhoto Halftoning Technology for accurate colours and smooth graduation. The printer is fully compliant with Windows 95 ICM and Macintosh.

- Up to 4ppm* colour, 6ppm* mono printing
- Photo quality printing up to 1440 x 720dpi
- Superb plain paper printing up to 720 x 720 dpi
- Windows & Mac compatible
- Advanced Dual Ink cartridge system with Quick-Dry Ink
- Super MicroDot technology produces smaller, precise dots for sharp edges and smooth reproduction of photo images.
- Windows 95 ICM and ColorSync 2.0 compliance
- The best all-round, high resolution personal printer for home office and small business
- Ideal for presentations, photo image reproduction, reports, flyers, newsletters, letterheads and correspondence

NB * The page per minute print speeds are a guide only. Actual print speed may vary under different conditions

EP5135
Epson Stylus
Color 600. **\$499**



The Epson Stylus Color 800 provides the business user with high-speed colour or mono printing, taking advantage of its high speed colour printing it is designed for multi-platform compatibility and networking. The Epson Stylus Color 800 features Epson's new Perfect Picture Imaging System, including MicroPiezo Technology and AcuPhoto Halftoning Technology.

- Up to 8ppm* mono, 7ppm* colour printing
- Photo quality printing up to 1440 x 720dpi
- Superb plain paper printing up to 720 x 720 dpi
- Optional Postscript & Network compatibility
- High capacity dual ink cartridge system with quick-dry ink
- Super MicroDot technology produces smaller, precise dots for sharp edges and smooth reproduction of photo images.
- Windows & Mac compatible
- The high performance, photo quality printer for business and graphics professionals

NB * The page per minute print speeds are a guide only. Actual print speed may vary under different conditions

EP5136
Epson Stylus
Color 800. **\$729**

EPSON Stylus Photo



Professional Photo-Reproduction Quality as easy as 1,2,3! With the EPSON Stylus Photo, it is easy to print professional-quality colour images yourself. With EPSON'S Micro Piezo printing and PerfectPicture Imaging Systems the EPSON Stylus Photo delivers outstanding photo-reproduction quality images with rich, natural colour.

The EPSON Stylus Photo offers full support for both Windows and Mac os, and features a number of software extras for enhanced creativity. The printer driver's new EPSON PhotoEnhance function allows you to correct exposure values and colour balance with just a single mouse click, and bundled LivePix software lets you add special creative effects like antiquing, embossing and distortion.

- Photo reproduction quality at 720 x 720 dpi
- Bundled software for enhanced clarity and
- 2 minutes to print 4" x 6" photo image
- Versatile paper handling

NB * The page per minute print speeds are a guide only. Actual print speed may vary under different conditions

EP5156
Epson Stylus
Photo. **\$789**

EPSON FilmScan 200



Studio
Quality

Studio-Quality Scanning at Home EPSON'S FilmScan 200, the film scanner makes it easy to scan positive and negative films directly into your computer. In addition to superior image quality, the FilmScan 200 gives you the convenience of continuous batch scanning for high-speed throughput. It's the quickest and easy way to digitize your film library and preserve your favourite images forever.

- Scan direct from film
- Convenient Batch Scanning
- Accepts multiple film formats

- 35mm strip film (Negative and Positive, Colour/Monochrome)
- 35mm slides (Mounted/Unmounted) Positive, Colour/Monochrome
- Film mounts (less than 2mm thick)
- Maximum read area and pixels 35mm film - 24 x 36mm (1 frame) 1,200 dpi
- Bundled software including PictureWorks, PhotoEnhancer, and Presto! PhotoAlbum

EP5200
Epson
PhotoScan **\$949**

EPSON PhotoPC 600



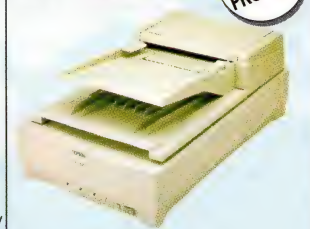
Feature
Packed

Affordable High-Resolution Digital Photography 810,000 Pixels of imaging power. Superb digital image quality and full-featured camera performance comes together in the new EPSON PhotoPC 600. Featuring 810,000-pixel colour CCD and a built-in 2-inch TFT monitor, this exciting new camera makes high-resolution digital imaging an affordable reality. The advanced colour CCD sensor captures an astounding 810,000 pixels, delivering 1024 x 768 XGA or 640 x 480 VGA images in brilliant, 24-bit colour. Storage capacity is high, with 4MB of internal memory that can be expanded simply by inserting an optional 4MB or 15MB Compact-Flash card in the external memory card slot.

- Wide angle lens with 3x Digital Step zoom
- Panorama Mode
- Macro & Monochrome Modes
- Multi Mode captures 9-shot sequence in a single frame
- Bundled Software
- 4MB memory
- 1024 x 768 pixels (super fine mode)

EP5201
Epson
PhotoPC 600 **\$Call**

EPSON GT 9500



NEW
PRODUCT

Professional-quality High-speed 12 Bit Colour Scanning. The new GT-9500 offers superior image quality and high throughput that professional's demand. Image quality is superb, with 600 dpi scanning that can be boosted to 4800 dpi by using the digital zoom. And TWAIN-compliant scan handling software gives you the convenience of auto-scaling, as well as an auto-reversal function that lets you view negative film images as colour positives. With the GT-9500's 12 bit scanning, you get exceptional tone details and colour quality on both positive and negative film scans.

- 600 dpi resolution
- Zoom 50% to 200% in 1% steps
- 5,096 dots x 7,020 dots at 600 dpi
- 36-bit (68.7 million colours) internal
- Optional Transparency unit
- Optional 30-page automatic document feeder
- Text enhancement technology

EP5091
Epson
GT 9500 **\$Call**

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HP PhotoSmart System

What is the HP PhotoSmart system?

Hewlett-Packard is setting a new standard for PC photography with the HP PhotoSmart PC photography system, including a digital camera, a photo scanner, a photo printer, photo imaging software and photo papers. (Note, the photo scanner, photo printer and photo papers will be available this summer). These products have been optimised specifically for photographic images. The quality is so good that you may not be able to tell the difference between an HP PhotoSmart print and a traditional photo!

How does the HP PhotoSmart system work?

With the HP PhotoSmart system, PC photography is easy! Start with a digital photograph or digitise an existing traditional photo. You can enhance it by enlarging it, cropping it, or using it creatively in any kind of project (let us Inspire you!). Or, you can simply print it. Either way, your PC photographs are ready in minutes. And, they look just the way you want them to look. With the HP PhotoSmart system, your photos and projects look so good that your friends and family may never guess that you did it yourself at home on your PC!

PC
photographs are
ready in minutes

Kiss Rescue Me!

KIS003



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Every Time.
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Digital Camera

The fast way to get photos into PCs

Taking a photo with the HP PhotoSmart digital camera is as easy as point and shoot. It has auto focus and exposure, and built-in flash. Instead of film, it records images digitally on an economical HP PhotoSmart photo memory card. When a card is full you can insert a new card and take more photos. After the photos are downloaded to your PC, you can erase and reuse these cards. Once downloaded to your PC you can quickly view and select only your best photos you want to print in minutes or send your photographs by E-mail or over the internet.

Makes it easy to set photos into your PC

- Auto exposure, auto flash, and auto date and time recorder
- Continuous auto focus with macro mode lets you take pictures as close as 2.5 inches
- Comes with Microsoft Picture It! software that lets you easily enhance your photos and use them to create photo projects on your PC
- Step-by-step instructions and creative project ideas on CD-ROM

Removable, reusable photo memory cards replace film

- Capture up to 32 photos on the 2MB photo memory card included
- Once photos are downloaded, photo memory cards can be re-used
- Purchase additional 2MB and 4MB photo memory cards for unrestricted picture taking on vacations and special occasions



Easy as point
and shoot

Specifications

- 640 X 480 resolution enhanced with PhotoSmart technology and 24-bit colour
- Seven element glass lens and enhanced optics for sharper pictures
- Continuous auto-focus 2.5 inches to infinity with Macro mode for great close ups
- Automatic exposure and 3-mode flash (auto, on, off) & 10 second self-timer
- Works with standard Windows 95 and TWAIN-compliant applications

HP5004 HP PhotoSmart Digital Camera

\$699

Photo Printer

Print real photos on your home PC

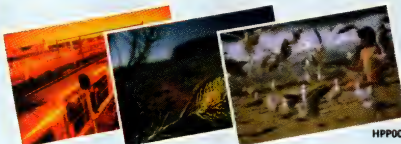
Print photos with the real look and feel of regular photos, suitable photo albums and framing using photographic papers that are comparable to what photo labs use but at a fraction of the cost.

Lets you do for yourself on your home PC what your photo lab does now

Make your own reprints, enlargements, and personalised photos. Produces quality text for personalised captions and greeting card messages. With built in flexibility produce enlargements as well do plain paper printing for kid projects and proofing.

Printer Specifications

- Print Speed 4 X 68 X 10
- Resolution Photographic Imaging Technology
- Multi-dye load thermal inkjet printing
- Memory RAM: 1MB ROM: 512KB
- Dimensions Height: 162.5mm (6.4 in)



Photographic Papers & Ink

All the supplies you'll need for the HP PhotoSmart PC Photography Printing System

With these special papers and ink, the projects you print with the PhotoSmart Photo Printer will look and feel like real photos. These special papers and ink are designed to produce photos like those you get from the photo processor. The paper has a special coating that controls ink interaction, producing clearer photos. The ink has been formulated to work effectively in very small drops. The result is more printable colours than any technology yet developed by HP for the home.

HP PhotoSmart Photographic Papers & Inks

\$Call

Photo Scanner

Scan photos, negatives, and slides into your PC

The HP PhotoSmart photo scanner is the quickest and easiest way to convert not only your existing photographs but also your slides and negatives. It's so easy that all you need to do is insert a photo, slide, or negative. Scan 35mm negatives and slides plus a variety of photo sizes from wallet-size to 5" X 7" enlargements. You can now make use of your negatives or slides for richer colours and greater detail for normal photos or enlargements.

Making photo scanning easy

- Automatically launches the HP PhotoSmart photo scanning software when you insert the photo, negative, or slide.
- Completes a typical preview scan of colour prints in 10 seconds, final scans in less than a minute.
- Displays negatives for easy viewing and selection.
- Includes a special photo sleeve that protects and makes it easy to scan fragile photos and unique items such as concert tickets, newspaper or magazine clippings, etc.
- Step-by-step instructions and creative project ideas on CD-ROM



Richer colours
and greater
detail

Scanner Specifications

- Dimensions 3.9" H X 8.0" W X 11.6" D
- Resolution 300 dpi optical for prints, 2400 dpi optical for slides and negatives
- Media Type Supported Photographic prints, 35mm negatives and 35 mm slides
- Maximum Scannable Photo Size Up to 5 X 7 inches
- Interface SCSI
- Data Source Full 32-bit TWAIN data source

HP5005 HP PhotoSmart Photo Scanner

\$999

Richer colours
and greater
detail



HP5004 HP PhotoSmart Photo Printer

\$999

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Index

Category	Page
Product Listing	2
Introduction	3
SOFTWARE	
Microsoft	4-7
Hot Deals	8
PCs/Thinkpads	9
Business	10-19
Graphics	20-24
Utilities	25-40
PERIPHERALS	
Networking	41-42
Multimedia	43-49
Storage	50-52
Inputs	52-53
Scanners	54-55
Printers	55-58
Modems	59-61
Specials	62
Leisure	63-64



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*See page 3 for Price Pledge

PRINTERS

HP LaserJet 6L

Convenient Quality

The Hewlett-Packard LaserJet 6L gives out-standing laser print quality at an affordable price. It is a complete, easy to use and convenient printing solution, the perfect replacement for the HP LaserJet 5L.

- 50% Larger Engine Speed
- 1Mb Memory
- 26 Scalable Fonts
- Up to 600 x 600dpi Print Quality
- 6000 Page Duty Cycle



\$699

HP DeskJet 400

Small footprint, small price tag, big performance.

The HP DeskJet 400 printer provides high-quality colour printing, yet takes up little desk space, operates quietly, and is ready to print vibrant and in full colour from the first time you turn it on.

The included Colour Kit with snap-in ink cartridges gives you the versatility you need to produce both classic black and white documents and colourful marketing pieces. Exclusive HP

ColorSmart technology makes adjusting colour for the greatest impact a breeze.



Features

- Snap-in Colour Kit allows printing of full-colour materials
- Exclusive HP ColorSmart eliminates guesswork for vibrant colour at the touch of a button
- Prints up to 16.7 million colours
- Simple three-button front panel and intuitive on-line help with graphical user interface
- Compact design includes paper tray that folds up neatly when not used
- Automatic 50-page sheet feeding
- Up to 3ppm in black for fast, high-quality printing

\$275

HP DeskJet 692C

Versatile printer with breakthrough photo-quality colour!

The HP DeskJet 690C printer can create rich black and dazzling colour printed pieces from your home or office. Banners, labels, stickers, personalised cards and invitations. Even iron-on transfers. The HP RealLife System ensures true-to-life images. Outstanding print quality with brilliant colours and sharp, crisp blacks. You also get effortless results with HP ColorSmart - it automatically adjusts settings for perfect colour every time and includes Photo Pen.



\$429

HP DeskJet 870Cxi

Premium printing for professional quality

The HP DeskJet 870Cxi is a state-of-the-art printer for professionals who don't compromise in performance, print quality and network flexibility. With the RealLife Imaging System featuring C-RET Colour Resolution Enhancement technology - the HP DeskJet 870Cxi delivers vivid, attention getting colour, sharp blacks, and enhanced resolution. And at print speeds that help you complete even the most complex jobs quickly.

- Professional black quality
- Fast black output up to 8 pages per minute
- Fast colour output 4 pages per minute
- Network - friendly
- Black resolution Best mode 600 dpi
- Colour Resolution Best mode 600 x 300 dpi



\$649

DESKJET PRINTERS

HWP168 HP DESKJET 340	\$469
HWP153 HP DESKJET 400	\$275
HWP203 HP DESKJET 670C	\$349
HWP201 HP DESKJET 692C	\$429
HWP027 HP DESKJET 820CXI	\$619
HWP025 HP DESKJET 870CXI	\$649
HWP220 HP DESKJET 1000CXI	\$755
HWP006 HP DESKJET 1600C	\$2379
HWP006 DESKJET 1600cm	\$3469

LASERJET PRINTERS

HWP007 HP LASERJET 5L	\$624
HWP200 HP LASERJET 6L	\$699
HWP134 HP LASERJET 6P	\$1189
HWP088 HP LASERJET 6MP	\$1529
HWP171 HP LASERJET 4V	\$3299
HWP222 HP LASER 4MV	\$4899
HWP010 HP LASERJET 5	\$1849
HWP046 HP LASERJET 5M	\$2899
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HWP012 HP LASERJET 5S1MX	\$6799
HWP221 HP LASER 5SI NX	\$5199
HWP048 HP COLOUR LASERJET 5	\$7399
HWP049 HP COLOUR LASERJET 5M	\$9399

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AUC101 HP Premium Transparency film A4 (20 sheets)	\$34⁹⁵
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AUC105 HP Premium Paper A4 (200 sheets)	\$34⁹⁵
AUC106 Photo Paper A4 20 sheet pack (DJ 690 only)	\$19⁹⁵
AUC109 HP Greeting Card Paper	\$20⁹⁵

HP Ink

Ink Cartridges - Deskjets & OfficeJet

AUC110 High-Capacity Black Ink, DJ400/500 series	\$39⁹⁵
AUC111 Tri-Chamber Colour Ink, 300/400/500 Series	\$44⁹⁵
AUC112 Black Ink, DJ/DW600 Series	\$39⁹⁵
AUC113 Tri-Chamber Colour Ink, DJ/DW600 Series	\$44⁹⁵
AUC114 Colour Inkjet Photo Cartridge (DJ 690 only)	49⁹⁵
AUC118 Black Ink, DJ1200 Series, CopyJet & DesignJet 2xx, 3xx & 650	\$39⁹⁵
AUC122 Black Ink, DJ 800, DJ1600 & DesignJet 700 Series	\$44⁹⁵
AUC123 Tri-Chamber Colour DJ800 Series	\$45⁹⁵

HP Toner

AUC125 Microfine Toner Cartridge LJ 5L (EP-A)	\$99⁹⁵
AUC126 Microfine Toner LaserJet 5P, 5MP, 6P & 6MP	\$129⁹⁵
AUC135 HP Toner Collection Kit Colour LaserJet 5 & 5MV	\$39⁹⁵

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PRINTERS

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Canon BJC - 5500

Full A2-size Colour and Monochrome Printing

Discover the Bigger Picture in High-performance All-Purpose Business Printing. With wide-format printing (A2-size), accelerated speed and full colour capabilities, the BJC-5500 is the bigger, better solution for your heavy-duty office printing needs.

From posters and displays to correspondence and envelopes, the BJC - 5500 is the one printer for every office task. The extra wide carriage offers up to 16" of print width for all popular paper formats up to tabloid - size A2. For continuous, heavy-duty printing the built-in pin-feed tractor accepts standard fanfold paper. Add the optional auto sheet feeder with one or two paper bins and you'll have totally automated printing for up to 200 cut sheets as well.

The BJC - 5500 is very fast printing up to 7 ppm in monochrome & handles coated and glossy papers, envelopes, high gloss film, black print film, transparency film and fabric sheets etc.

Wide-format printing (A2-size), accelerated speed, full color capabilities. The BJC-5500 is the bigger, better solution to heavy-duty office printing needs.



CAN225 Canon BJC5500 ... **\$1329**

Canon BJC - 7000

Finished Output Like You've Never Seen Before

Canon have re-defined, re-invented and changed printers; they've created a new class of printer! The Canon BJC - 7000 sees the introduction of P-POP for plain paper, second generation PhotoRealise, 99.4% water fastness and full bleed printing.

Here is just a few of the differences

P-POP: Optimises plain paper to perform like coated paper.

Second Generation PhotoRealism: 91 times more colour combinations per pixel than conventional CMY inks.

7 Colour printing process: High and low-density links produce 9 saturation levels per pixel on any medium.

99.4% water fast: Documents last longer, look better, with almost no fading, and are 99.4% water fast!

Breakthrough Ink Cartridges: The new ink system with larger ink cartridges uses up to 1088 nozzles firing 10,000 drops per second.

Higher Resolution: Prints up to 1200 dpi with ink drops that are 75% smaller than any previous Bubble Jet model. Better Paper Handling: Prints widths up to full-bleed A4, and paper weights up to 550 gsm.



CAN005 Canon BJC7000..... **\$669**

Canon BJC - 80

Portable Colour Bubble Jet Printer

With breakthrough colour, super fast blacks and cable-less communications.

The BJC - 80 combines the benefits of a personal laser, a photo quality printer, optional scanner, and, with appropriate software, a fax, all in one unit. The versatile BJC - 80 is small enough to slip into a brief case and by simply changing the cartridge from the colour cartridge to a dedicated black cartridge you can print laser like finish documents at speeds up to 5 ppm. Colour Scanner. Convert your printer into a colour scanner (Scanner head optional). Pop out the print head and clip in the colour scan head, add the appropriate software and scan documents for faxing & OCR, or scan colour graphics for image manipulation. Image Optimisation for the Internet. The BJC - 80 enables you to optimise low resolution Internet images, printing them out at the maximum resolution supported by your printer.

Cable-less communication. With the infrared port and the optional battery kit enabling you to print up to 200 pages the BJC - 80 offers cable-less operations; lugging cables is a thing of the past.



CAN001 Canon BJC80 Portable **\$469**

Canon's Range of Printers/Scanners & Cameras

CAN003	CANON BJ210	\$229
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CAN048	CANOSCAN CS-300	\$479
CAN051	CANOSCAN CS-600	\$699
CAN058	CANON POWERSHOT 350	\$879
CAN039	CANON POWERSHOT 600	\$1299

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Index

Category	Page
Product Listing	2
Introduction	3
SOFTWARE	
Microsoft	4-7
Hot Deals	8
PCs/Thinkpads	9
Business	10-19
Graphics	20-24
Utilities	25-40
PERIPHERALS	
Networking	41-42
Multimedia	43-49
Storage	50-52
Inputs	52-53
Scanners	54-55
Printers	55-58
Modems	59-61
Specials	62
Leisure	63-64

OKIPAGE 4W LED Laser

A personal printer with low running costs, ideal for Windows users in the small and home office.

With the OKIPAGE 4W you are able to control printing directly from your PC, quickly returning to your application.



OKI
People to People Technology



Windows 3x, Windows for workgroups and Windows 95 Compatible

OK006 OKIpage 4W

\$399

OKI 810E LED Laser

The OKI OL810E LED Laser is ideal for the high quality personal desktop publishing market requiring high speed printing (fastest in its class with 14 secs to first print) and a huge 250 sheet standard capacity with versatile paper handling options. It is suited to the shared work group environment and also has an optional True Adobe Postscript Level 2.



OKI
People to People Technology



Fastest in its Class

OKI007 OKI 810E

\$1079

Modem Wizard 97

Make Perfect Modem Connections Every Time -



Automatically

Eliminate these problems:

- Modem won't dial
- Dials but won't connect
- Hangs up for no reason
- Will not answer
- Doesn't connect at right speed
- No dial tone
- Connections seem too slow
- Fax/modem not recognised
- Works fine in DOS but not Windows
- Dial-Up Networking doesn't work right
- Can't get you Internet Access ISP configured properly
- Changed Internet Service Providers and can't get on the net

Includes TrueSpeed, Modem Monitor, Modem Exchange & much, much more!



MS1018 Modum Wizard

\$49

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PalmPilot

To keep you organised and in-touch with your PC!



INCLUDES FREE CABLE

Note: existing Pilot 1000/5000 users can upgrade to Palm Pilot Professional with this 1 meg upgrade card

NEW PRODUCT

- Features for PalmPilot Personal & Professional
- Back-lit Display
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- Flashroom upgradeable
- Programmable using "Code Warrior" for MAC/PC
- 2 x AAA battery (included in pack)
- Storage Capacity:
- PalmPilot Personal (512K) edition: 2500 addresses, 2400 appointments, 500 "to do" items and 500 memos.
- PalmPilot Professional (1 Meg) Edition: 4000 addresses, 2400 appointments, 750 "to do" items, 750 memos and 100 emails.

USR020 PalmPilot Personal	\$459
USR021 PalmPilot Professional	\$575
USR024 1 Meg upgrade card	\$157

Sportster Flash

x2 56K (External)
Quality at an affordable price

NEW PRODUCT



Sportster Flash x2 56K Features

- Fax/Modem with Digital Personal Voice
- Full Duplex Speaker Phone (Handsfree Telephone)
- Fast data transmission 56.6K depending on server
- Plug & Play (WIN 95)
- Reflash ROM
- 5 Year Warranty

5 Year Warranty

For more information about any of the above products please look up the US Robotics Webpage: <http://www.usr.com.au>

USR040 Sportster Flash x2 56K (External)	\$269
Also available (not pictured)	
USR022 Courier V. Everything x2 33.6K (external) free upgrade	\$319
USR023 Worldport 33.6K PCMCIA Card	\$345

Banksia Wave SP

The fully featured 56,000bps modem!

FREE WEB & INTERNET SOFTWARE

5 YEAR WARRANTY

The Wave SP is the first modem to be awarded a prestigious Australian Design Mark in recognition of design excellence and innovation. The assessment panel commented that "the Wave SP is radically different from its competitors and upholds the highest principles of unitary design".



Banksia's revolutionary new wave SP Fax Modem includes;

- High speed data transmission at 56,000bps
- Fax transmission at 14,400bps
- Simultaneous voice & data (SVD) transmission
- Full duplex speakerphone (hands free telephone)
- Fully featured smart answerphone
- Microsoft Internet Explorer™ for Internet surfing & Web site construction
- The best new games
- A radical new shape for optimum audio performance



BAN003 Banksia Wave 56.6 SP Fax Modem	\$279
AUZ134 Banksia Wave 33.6 SP Fax Modem	\$229

All prices INCLUDE sales tax. Prices subject to change, see page 3 for terms & conditions.

ComboCard 336

Network, Internet, Fax & Remote Communication in One Card

Ideal for the mobile professional

Features:

- Network and remote connectivity via LAN
- Remote connectivity via phone line
- Send and receive data at speeds up to 33,600bps
- Fax direct from your PC at 14,400bps
- Simultaneous ethernet & faxmodem operation
- Sleep mode conserves your notebook's battery
- Smart answerphone



BAN002 Combo Card	\$499
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WebRamp M3

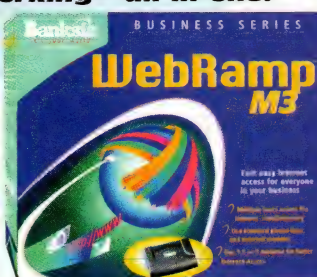
Give everyone simultaneous Internet access plus networking - all in one!

WebRamp M3 has no technical limit to the number of users. Faster modems will improve overall performance. WebRamp will bring email to the small office, browsing for everyone on the LAN. It will enable file transfers over the net and access to the most common Internet applications.

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NetComm Roadster56 Ultra Summer Special*

With the recent release of the Roadster56 Ultra, Netcomm is offering an explosive deal this summer.

Those games freaks will be in for a treat, when they open their Netcomm Roadster56 Ultra this Xmas. The Limited Edition offer contains everything you need, it not only gets you on the Net for free, but also gets you hooked up to Multiplay for one month free, plus you get three trial versions of the latest games. What more could a games addict need?

And, all this at no extra cost!

The full details of the package are as follows, and all for the low price of \$299 RRP ex tax.

Summer Special Includes:

- 20 FREE hours of Internet time
- 1 Month Unlimited free access to Multi-Play
- First 2000 come in a clear casing
- FREE trial games: Quake, Shadow Warrior, Duke Nukem



Features

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- One month free subscription to MULTIPLAY - play the worlds most popular games against opponents all over Australia over the Net.
- 20 hours free Internet time from Access One - with no registration fee!



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NET135 Roadster 56 Flex Summer Pack	\$259
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Accura 33.6 Data/Fax/Voice



FREE WEB & INTERNET SOFTWARE

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World's fastest modem 230, 400 bit/s Voice/Data/Fax, remote configuration, security flash upgradeable, leased line ideal for business or the power user.

AUP169 Accura 33.6K Modem	\$189
AUP171 Optima PC Card Modem GSM	\$429
AUP172 Optima Business Modem V34	\$359

All prices INCLUDE sales tax. Prices subject to change, see page 3 for terms & conditions.

NetComm CardModem 56k Combo

Occupying one PC Card slot,

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- PC Card Type II
- 56 Flex technology
- DigitalLine Protection
- Plug and Play



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How fast do you want to get there?



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- upgrades to modern features, eliminate old equipment
- V.34 Support - Modems support ITU-T V.34 technology to provide maximum support connecting to V.34 modems
- 5 year warranty, free lifetime technical support

HAY022 Accura 56K Speakerphone Internal Modem	\$299
HAY023 Accura 56K Data/Fax External Modem	\$299
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Index

Category	Page
Product Listing	2
Introduction	3
SOFTWARE	
Microsoft	4-7
Hot Deals	8
PCs/Thinkpads	9
Business	10-19
Graphics	20-24
Utilities	25-40
PERIPHERALS	
Networking	41-42
Multimedia	43-49
Storage	50-52
Inputs	52-53
Scanners	54-55
Printers	55-58
Modems	59-61
Specials	62
Leisure	63-64



60

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MODEMS

Xircom CreditCard Modem 56

Innovative 56K PC Card modem offers notebook users performance benefits today and tomorrow.



The Xircom CreditCard Modem 56 - GlobalACCESS is a versatile communication solution which enables you to access information for any location, anywhere in the world. This innovative PC Card offers notebook users more frequent connections at higher speeds than current v.34 modems, up to 56Kbps.

A GlobalACCESS product, the CreditCard Modem 56 features unique enhancements for international travelers. These include international approvals for the most reliable connections, and software which automatically configures the modem to local dialing conventions when traveling from country to country.

Features:

- Robust High-speed connections - provides more frequent connections at higher speeds than current v.34 modems.
- GlobalAccess - One card for worldwide use, internationally approved to ensure reliable connections worldwide; also includes CountrySelect which simplifies modem set-up when traveling.
- Flash ROM-upgradable Allows quick and easy software upgrades
- Digital Shield - protects your modem against high-current digital phone lines.
- Easy Installation - Installation program automatically configures notebook and modem
- Limited Lifetime warranty Hardware, 2 years software.

XIR036 CreditCard Modem 56 **\$379**

CreditCard Ethernet 10/100 + Modem 56

Innovative 10/100 Ethernet and 56K modem functionality offers notebook users performance benefits today and tomorrow.



The CreditCard Ethernet 10/100+Modem 56 from Xircom's award-winning family of Fast Ethernet products combines a 10/100Mbps Ethernet adapter and high-speed 56K modem in a single PC card.

This fast Ethernet combination PC Card offers seamless operation on 10Mbps and 100Mbps networks, as well as modem speeds up to 56Kbps. It protects your investment by enabling you to purchase an Ethernet+Modem PC Card today, with speeds that meet your needs in the future. A GlobalACCESS product, the CreditCard Ethernet 10/100+Modem 56 features unique enhancements for international travellers.

Additionally, Xircom's optional GSM connection kits provide truly mobile solutions by connecting your Xircom Ethernet+Modem Card to a GSM phone.

Whether in the office, at home or traveling internationally, the CreditCard Ethernet 10/100+Modem 56 gives you the flexibility to take advantage of performance benefits today and tomorrow.

Limited Lifetime warranty Hardware, 2 years software.

XIR035 CreditCard

Ethernet 10/100 + Modem 56 **\$645**

GSM Connection Kit

GSM Connection Kit connects your Xircom modem to a GSM phone providing true mobile connectivity.

GSM Connection Kit **Call**

Xircom CreditCard GSM

Connect Anywhere, Anytime: use Xircom's GSM PC Card to send and receive data, faxes or SMS messages while you're on the move.



Connect to your corporate network, stay in touch with your business, surf the Internet or access E-mail while you're on the move. Enjoy the freedom of data communication in an airport or at a customer site anywhere in the world without being tied to a telephone socket. The CreditCard GSM is the ideal solution for all your mobile connectivity needs.

The GlobalACCESS CreditCard GSM provides notebook users with data and fax communication over GSM (Global System for Mobile Communications) networks worldwide. Connect your GSM handset to the Xircom CreditCard GSM PC Card and turn your notebook into a mobile office. A member of Xircom's comprehensive family of Global ACCESS PC Cards, the CreditCard GSM increases your productivity by enabling you to send and receive data, faxes and SMS messages on your notebook.

Features:

- Send and receive Data - Transfer files, e-mail or surf the internet over a digital GSM link at speeds up to 9600bps
- Fax - Send and receive faxes.
- SMS - The Short Message Service (SMS) enables users to send and receive messages up to 160 characters on the notebooks.
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- Limited Lifetime warranty Hardware

XIR036 CreditCard Modem 56 **\$419**

Zoom V.34XE Modem

High-speed communication with Zoom V.34xe Modem

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NEW PRODUCT

Features

- Supports both the V.34ITU standard and V.Fast Class 28,800bps
- Caller ID compatible
- V.17 protocol for 14,400bps fax capability
- V.42bis and MNP 5 data compression
- V.42 compliant error correction
- Includes five-year warranty
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- Telstra duct compatible

Zoom Guard lighting and surge protection

ZO0011 Zoom 33.6K Fax/Data (External) **\$185**

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Instantly Surf the Internet with software from OzEmail.

5 Year Warranty

BAN001 Simple Modem 33.6 (ext) **\$149**

Simple Modems

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Simple 336 Data Fax Voice Modem

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The Business Pack makes connecting to the Internet easy by providing a complete set of communication tools to ensure you get the most out of the time you spend on the internet.

The Business Pack provides these tools.

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VOICEMAIL 9 individual boxes



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Index

Category Page
Product Listing 2
Introduction 3

SOFTWARE

Microsoft 4-7
Hot Deals 8
PCs/Thinkpads 9
Business 10-19
Graphics 20-24
Utilities 25-40

PERIPHERALS

Networking 41-42
Multimedia 43-49
Storage 50-52
Inputs 52-53
Scanners 54-55
Printers 55-58
Modems 59-61
Specials 62
Leisure 63-64



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62

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TRA121 Power Japanese.....**\$129**



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Power Chinese is specifically designed for the native English speaker. Comparisons are made throughout Power Chinese between how things are done in English versus how things are done in Chinese. These comparisons make learning Chinese easier and more enjoyable as you need only to focus on those aspects of the language which are significantly different from English.

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- Exclusive algorithmically driven engine feature ensures no two lesions are ever the same

Transparent Language

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WordAce! Bilingual Talking Translation Dictionary

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TRA112 English/German	\$49	TRA117 English/Swedish	\$49
TRA113 English/Italian	\$49	TRA118 English/Finnish	\$49
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63

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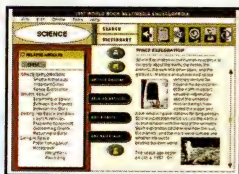
IBM and World Book have launched the international edition of the new 1997 World Book Multimedia Encyclopedia, linking cutting-edge technology with the world's most authoritative and best-selling reference work to provide the ideal learning resource for school or home. Designed specifically to meet curriculum needs of primary and secondary school students and containing a host of unique features, 1997 World Book Multimedia Encyclopedia is the ideal homework aid and reference work that is easy and fun to use for students, parents and teachers.

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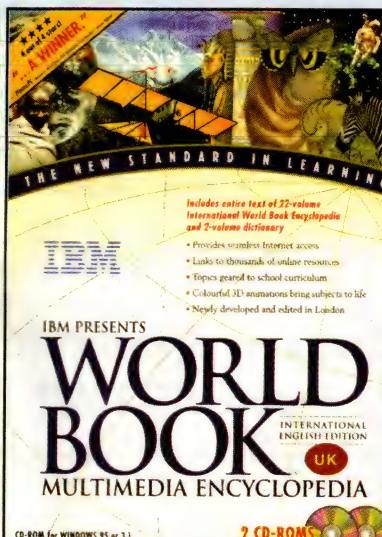
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Designed for Microsoft Windows 95

Index

Category	Page
Product Listing	2
Introduction	3
SOFTWARE	
Microsoft	4-7
Hot Deals	8
PCs/Thinkpads	9
Business	10-19
Graphics	20-24
Utilities	25-40
PERIPHERALS	
Networking	41-42
Multimedia	43-49
Storage	50-52
Inputs	52-53
Scanners	54-55
Printers	55-58
Modems	59-61
Specials	62
Leisure	63-64

Riven: The Sequel to Myst

Prepare yourself for Riven, the much anticipated sequel to Myst, the best selling computer game of all time.

Leebro 17

...my worst fears are realised, the damage is more extensive than I ever imagined. I must get everyone off Riven as soon as possible, before its total collapse. The problem now is my father. My dear Catherine, what will be her fate... if he's still the same? I'm afraid it will take more than I, Atrus, to outwit Gehn... and his corruptive ways. I must act while there's still time. I must find someone... to send to Riven. Soon, it will be time. Prepare to enter a world "torn asunder" by timeless, unresolved conflicts, a world of incomparable beauty, intrigue, and betrayal. Prepare to go to Riven.

Journey through vast, awe-inspiring landscapes where clouds sit nestled in a deep blue sky and the rolling sea waters shimmer from bright morning sunlight. But be forewarned, nothing is quite as it seems. Reclusive beings and mysterious creatures populate the land. Deep, dark secrets lay hidden at every turn.

Your utmost powers of observation and reason are required to complete a most elusive task. You must let Riven become your world. Only then may the truth be discovered and a world be saved. Riven stands as a story for all time, a story that evokes a sense of awe, wonder, and profound purpose. Prepare to go to Riven — a world... unlike any you've ever known.

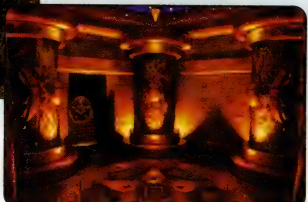
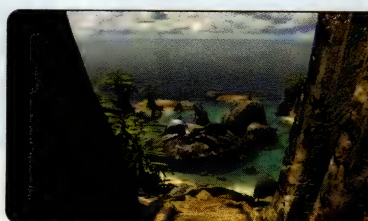
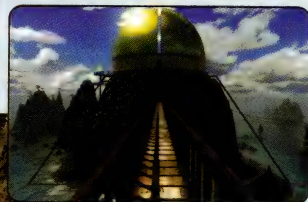
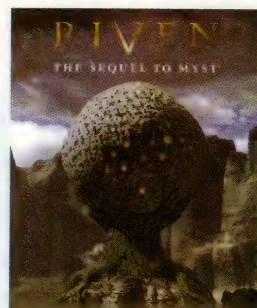
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Features

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- Impressive, multi-track sound

MYS002 Riven: The sequel to Myst



\$89

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ADE Vantage P-200

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- 16MB RAM
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At Adelong, we try to keep our customers updated with the **latest technology** at the most **competitive prices**. Our **ADE Advantage PENTIUM II pcs** are now even more powerful and technologically advanced thanks to new innovations like **Intel LX chipsets, Ultra ATA, AGP Graphics and SDRAM** for even more speed. Two **HOT** new technologies to keep an eye on include **DVD** - similar to a CD-Rom drive, but holds a far greater storage capacity, and will allow you to use multimedia programs containing high quality audio, video and 3D graphics. Take a look at **Creative's PC DVD Encore DXR2 Kit**. Can a Floppy drive hold **120MB**? Yes, the new **Mitsubishi LS-120** is now a reality, we carry the drive and the floppy disks to suit - it reads your standard 1.44MB floppy disks too! On behalf of Adelong Computers, I would like to wish you all a **Merry Christmas** and a **Happy New Year!**

Frank Shirazi
General Manager
Adelong Computers



I N D E X	Page 2-3	ADE Computer Packs	Page 8	Graphics Cards and Monitors	Page 13	Data Switches
	Page 4-5	Mainboards/ADE Networking	Page 9	Multimedia & Internet	Page 14	Consumables
	Page 6	Mitsubishi Products	Page 10	Processors, Memory & Cases	Page 15	Cables and Adaptors
	Page 7	Storage & Backup	Page 11	Printers	Page 16	Software/Ordering
			Page 12	Input Devices/Networking		



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* ADE PACK

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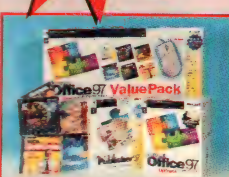
- *Microsoft Home Essentials '97
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- *Maffee Virus Scan
- *Maffee Web Scan



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- VALUE PACK Inc.
- Microsoft Intelli Mouse.
- Microsoft Word '97, Microsoft Excel '97, Microsoft Powerpoint '97, Microsoft Access '97, Microsoft Outlook, Microsoft Bookshelf Basic, Microsoft Publisher '97, Microsoft Encarta '97, Microsoft Picture It!, Microsoft Money '97, Microsoft Internet Explorer, Microsoft Games Sampler, Norton Anti-Virus.



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- Intel 166Mhz Pentium Processor with MMX
- 16MB EDO RAM
- 2.1 GB Hard Drive
- 24 Speed CD-ROM
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- 90W Amplified Speakers
- 2MB PCI Graphics Card
- 14" Colour Monitor
- 3 Button Mouse and Pad
- 104 Key Win95 KB
- ADE Medium Tower Case
- MS Windows 95

\$1595

SYADE004

Advantage P200 MMX

- Intel 200Mhz Pentium Processor with MMX
- 32MB SDRAM
- 3.2GB Ultra ATA Hard Drive
- 24 Speed CD-ROM
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- Jazz 100W 3D Speakers
- Diamond Viper V330 4MB Graphics Card
- 15" Colour Monitor
- MS Intellimouse and Pad
- 104 Key Win95 KB
- ADE Minitower Case
- MS Windows 95

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Advantage P233 MMX

- Intel 233Mhz Pentium Processor with MMX
- 32MB SDRAM
- 3.2GB Ultra ATA Hard Drive
- 24 Speed CD-ROM
- Sound Blaster AWE 64 Sound Card
- Jazz 200W 3D Speakers
- Diamond Viper V330 4MB Graphics Card
- 15" Colour Monitor
- MS Intellimouse and Pad
- 104 Key Win95 KB
- ADE Minitower Case
- MS Windows 95

\$2595

SYADE006

Advantage PII-233

- Intel 233Mhz Pentium II Processor with MMX
- 32MB SDRAM
- 3.2GB Ultra ATA Hard Drive
- 24 Speed CD-ROM Drive
- Sound Blaster 16 Sound Card
- Jazz 100W 3D Speakers
- 4MB Diamond Viper AGP Graphics Card
- 15" Colour Monitor
- MS Intellimouse and Pad
- 104 Key Win95 Keyboard
- ADE ATX Case
- MS Windows 95

\$2950

SYADE007

Advantage PII-266

- Intel 266Mhz Pentium II Processor with MMX
- 32MB SDRAM
- 3.2GB Ultra ATA Hard Drive
- 24 Speed CD-ROM Drive
- Sound Blaster 16 Sound Card
- Jazz 100W 3D Speakers
- 4MB Diamond Viper AGP Graphics Card
- 15" Colour Monitor
- MS Intellimouse and Pad
- 104 Key Win95 Keyboard
- ADE ATX Case
- MS Windows 95

\$3190

SYADE008

Advantage Server

- Intel 233Mhz Pentium II Processor with MMX
- 64MB SDRAM
- 4.3GB Quantum Atlas II U/W SCSI
- Adaptec AHA2940 U/W
- 12 Speed SCSI CD-ROM Drive
- 2MB S3 PCI Graphics Card
- 15" Colour Monitor
- MS Intellimouse and Pad
- 104 Key Win95 KB
- ADE ATX Case
- 3COM PCI Ethernet Card

\$3990

SYADE0014

Power Advantage PII-233

- Intel 233Mhz Pentium II Processor with MMX
- 64MB SDRAM
- 4.3GB Ultra ATA Hard Drive
- 24 Speed CD-ROM Drive
- Sound Blaster AWE 64 Sound Card
- Jazz 300W 3D Speakers
- 4MB Diamond Viper AGP Graphics Card
- 17" Colour Monitor
- MS Intellimouse and Pad
- 104 Key Win95 Keyboard
- ADE ATX Case
- MS Windows 95

\$3790

SYADE009

Power Advantage PII-266

- Intel 266Mhz Pentium II Processor with MMX
- 64MB SDRAM
- 4.3GB Ultra ATA Hard Drive
- 24 Speed CD-ROM Drive
- Sound Blaster AWE 64 Sound Card
- Jazz 300W 3D Speakers
- 4MB Diamond Viper AGP Graphics Card
- 17" Colour Monitor
- MS Intellimouse and Pad
- 104 Key Win95 Keyboard
- ADE ATX Case
- MS Windows 95

\$3990

SYADE0010

Power Advantage PII-300

- Intel 300Mhz Pentium II Processor with MMX
- 64MB SDRAM
- 6.4GB Ultra ATA Hard Drive
- 24 Speed CD-ROM Drive
- Sound Blaster AWE 64 Sound Card
- Jazz 300W 3D Speakers
- 4MB Matrox Millennium II AGP Graphics Card
- 17" Colour Monitor
- MS Intellimouse and Pad
- 104 Key Win95 Keyboard
- ADE ATX Case
- MS Windows 95

\$4895

SYADE0011

ADE 586TX

PCI-PENTIUM MAINBOARD

SYSTEM MEMORY

- 2 x 168pin 72bit DIMM modules
- 2 x 72pin SIMM modules
- Supports both FPM & EDO mode DRAM

PCI IDE

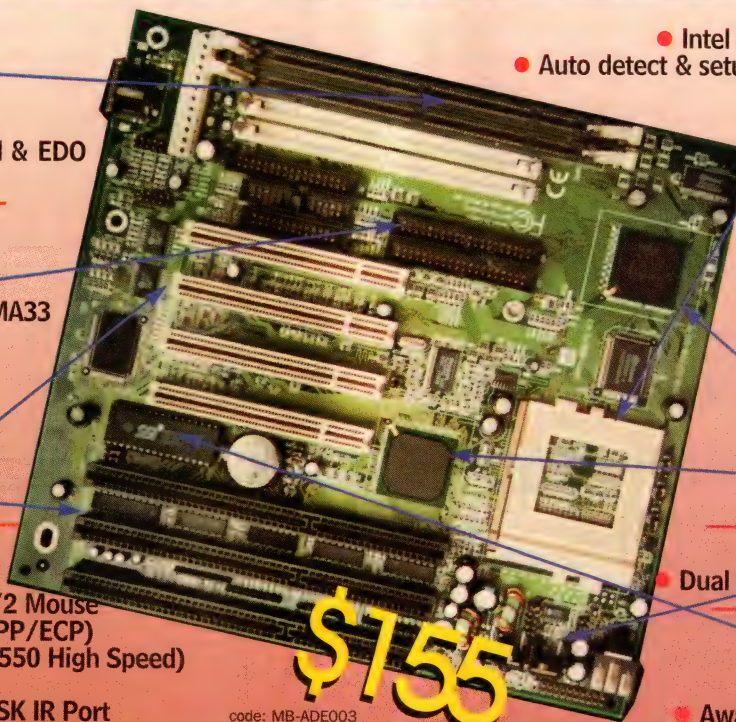
- 2 x PCI Bus Master IDE ports
- PIO Mode 3, 4, UDMA33 IDE & ATAPI CD-ROM

EXPANSION SLOTS

- 4 x PCI 32 bit
- 3 x ISA 16 bit

I/O INTERFACE

- 1 x Floppy port
- AT Keyboard & PS/2 Mouse
- 1 x Parallel port (EPP/ECP)
- 2 x Serial ports (16550 High Speed)
- 2 x USB ports
- 115.2 Kbps IrDA/ASK IR Port



code: MB-ADE003

\$755

PROCESSOR

- Intel Pentium series up to 266 Mhz
- Auto detect & setup Intel P54C, P55C processor (MMX)
- AMD K5 and K6 (MMX) Processors
- Cyrix 686 (M1) & M2 (MMX) Processors

CACHE RAM

- 512KB PB SRAM

BOARD SIZE

- 22 x 24cm
- AT Form

CHIPSET

- Intel 82430TX

CPU POWER

- Dual Switching Voltage Regulators

SYSTEM BIOS

- 128KB Flash Rom
- Plug "n" Play
- Award BIOS with Green Features

ADE ADVANTAGE NETWORK PACK

Small Business Network Solutions

At Adelong Direct we try to provide the best cost effective solution to our customers. To facilitate those wishing to upgrade existing machines but have not got around to doing so, and for those who are contemplating a purchase of new computing equipment or simply wishing to add more workstations to an existing LAN, the time to do so is now. Our Ade SOHO server is the ideal entry point into the world of LAN. File and print sharing, provides a better point of communication for all users resulting in greater productivity gains for all. Remember as your business grows, our Advantage systems will grow with you.

ADE SOHO Server

code: SYADE015

Intel 200Mhz Pentium Processor with MMX
64MB SDRAM
1.4MB Floppy Drive
4.3GB Ultra ATA Hard Disk
24 Speed CD-ROM
IMB S3 Trio64V+
14" Colour Monitor
EZ 3200 PCI Ethernet Card
MS Mouse and Pad
104 Key Win95 KB
ADE Medium Tower Case
NT Workstation 4.0

Options:

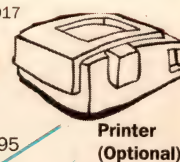
- | | |
|----------------------------------------|-------|
| • Extra Workstation | \$890 |
| • MS Windows NT Server 5 user | \$850 |
| • Windows 95 | \$145 |
| • Hewlett Packard 6L Printer | \$655 |
| • MS Office97 (Small Business edition) | \$299 |

\$4750

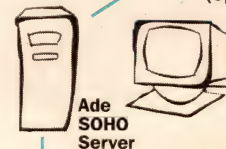
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Network Pack includes:

- 1) Ade SOHO Server with MS Windows NT 4.0 Workstation
- 2) 2 x ADE Workstations with MS Windows 95
- 3) 8 Port Ethernet Hub
- 4) RJ45 Cabling



Printer (Optional)



ADE SOHO Server



HUB

Ade Workstation 1
code: SYADE016

Ade Workstation 2

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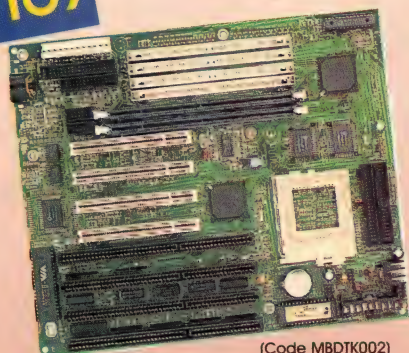




DTK MAINBOARDS

DTK Group, founded in 1982 is a leading designer and manufacturer of personal computer systems. With the efforts and devotion of DTK staff, DTK Computer was named one of the three largest PC manufacturers in 1990, 91, 92 and 93 in Taiwan. In 1990, president Duke Liao was awarded "Young Model Entrepreneur" and 44th Outstanding Businessman "Golden Business Award". Today, DTK group has expanded its international service through world wide branch offices and distributors.

\$169



(Code MBDTK002)

DTK Pentium TX High Performance Mainboard PAM-00571

PAM-00571 AT Pentium PCI/ISA. Intel 82430TX Chipset High Performance Mainboard

New Features

1. CPU/System Temperature Monitoring
2. Switching Voltage Regulator Support

System Processor

Intel Pentium, MMX series, Cyrix 6x86, M2 series and AMD K5, K6 series, up to 266Mhz

Cache System

Pipeline Burst Mode SRAM size 256/512Kb

Main Memory

1. Four 72-pin SIMM Socket, support both FP Mode DRAM Modules configuration up to 256Mb
2. Two 168-pin DIMM Socket, support 3.3V SDRAM configuration up to 256MB

Chipset

Intel 82430TX PCIsset

Bios System

1. Award/AMI
2. Supports Flash ROM BIOS
3. Supports Plug "n" Play

Super I/O

SMC669 or Winbond W83877F

Multi I/O

1. On board Multi I/O supports two serial, one parallel port and floppy drive controller
2. Serial Ports are 16550 Fast UART compatible
3. Parallel port has EPP and ECP capabilities

I/O Slots

1. Four 32-bit Master PCI
2. Four 16-bit ISA

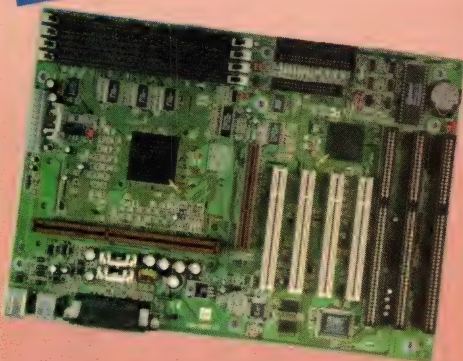
PCI IDE

1. PCI Master IDE controller supports PIO Mode 3 and 4 devices, I/O data transfer rate can be up to 17Mb/s
2. Supports Ultra DMA33

USB

On board supports two USB ports for USB devices

\$275



(Code MBDTK005)

DTK Pentium II LX Mainboard PRM-00761

PRM-00761 PCI/ISA Single Processor ATX Format Intel 82440LX High Performance Mainboard

New Features

1. CPU/System Temperature Monitoring
2. Switching Voltage Regulator Support

System Processor

Intel Pentium II series, up to 300Mhz

Main Memory

1. Four DIMM Sockets, memory configurations up to 512Mb
2. Supports both Synchronous DRAM and EDO Mode Modules
3. ECC Function ensures data correction and integrity

Chipset

Intel 82440LX PCI set

Bios System

1. Award / AMI
2. Supports Flash ROM BIOS
3. Supports Plug "n" Play

Super I/O

SMC FD C37C672

Multi I/O

1. On board Multi I/O supports two serial, one parallel port and floppy drive controller
2. Serial ports are 16550 Fast UART compatible
3. Parallel Port has EPP and ECP capabilities
4. Irda Allows serial communication at baud rates of up to 4Mbps

I/O Slots

1. Four 32-bit Master/Slave PCI
2. Three 16-bit ISA
3. One 64-bit AGP(66Mhz)

PCI IDE

1. PCI Master IDE controller supports PIO Mode 3 and 4 devices, I/O data transfer rate can be up to 17Mb/s
2. Support Ultra DMA33

USB

On board supports two USB ports for USB devices

Green Function

1. True green functions, Support SMM, SMI and CPU stop clock functions
2. Four power saving states: Normal, Standby, Suspend and Off

DTK Dual Pentium Pro AT High Performance Mainboard PRM-00321 with SCSI CONTROLLER

1. CPU Dual Intel Pentium Pro series up to 200Mhz.
2. Chipset Intel 82440FX PCIsset.
3. Architecture PCI SCSI - Adaptec 7880 Ultra SCSI plus PCI Master IDE controller supports PIO Mode 3 & 4 devices, I/O data transfer rate up to 22Mb/s. 4 x 32 bit Master/Slave PCI & 3 x 16 bit ISA slots.
4. System Memory 6 x 72 pin SIMM Modules, memory config. up to 384Mb supports both FPM and EDO mode DRAM.
5. System BIOS Award/AMI, supports flash ROM BIOS, Green Features.
6. Board AT Form.

\$649

(Code MBDTK000)

DTK Pentium Pro AT High Performance Mainboard PRM-00311

1. CPU Intel Pentium Pro series up to 200Mhz.
2. Chipset Intel 82440FX PCIsset.
3. Architecture PCI Master IDE controller supports PIO Mode 3 & 4 devices, I/O data transfer rate up to 22Mb/s. 5 x 32 bit Master/Slave PCI & 3 x 16 bit ISA slots.
4. System Memory 6 x 72 pin SIMM Modules, memory config. up to 384Mb supports both FPM and EDO mode DRAM.
5. System BIOS Award/AMI, supports flash ROM BIOS, Green Features.
6. Board AT Form.

\$305

(Code MBDTK001)



MONITORS



MOMIT 000 Mitsubishi Diamond Pro 21" Colour Monitor
A new DIAMONDTRON Monitor, with the super-fine aperture grille pitch of 0.28mm. **\$ 2,999.00**

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A new DIAMONDTRON Monitor, with the super-fine aperture grille pitch of 0.25mm. **\$ 1,999.00**



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Advanced Plug & Play compatibility, Superior image fidelity - 0.27DP. **\$ 895.00**

MOMIT 003 Mitsubishi Diamond View 15" Colour Monitor
Advanced Plug & Play compatibility, Superior image fidelity - 0.28DP. **\$ 495.00**

MEDIA



MMMIT 000 Mitsubishi Diamond Data 24x CD-ROM Drive
*E-IDE/ATAPI interface
*3600KB/sec maximum data transfer rate (24x max)
*125ms typical access time **\$165 00**

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- * Supported by MS DOS, Windows (3X, 95, NT) and all major bios providers
- * 5 times faster than standard 1.44MB drives when using LS-120 diskettes
- * Bootable, can act as a Boot Drive and be viewed by a PC system as Drive A, when appropriate BIOS installed

BUMIT 000 Mitsubishi LS - 120 - 120MB Capacity.
The new standard in diskette storage. **\$220.00**

BUMIT 001 120MB capacity diskettes to suit LS - 120 Drive **\$25.00**

FDMIT 000 Mitsubishi Diamond Data 1.44MB Floppy disk drive **\$45.00**



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HARD DISK DRIVES

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HD DRIVES

Code	Model	Cap. GB	Seek ms	Motor RPM	Price
HDMAX000	CRYSTAL MAX	1.7	11	4500	\$259
HDMAX001	CRYSTAL MAX	2.1	11	4500	\$299
HDMAX002	CRYSTAL MAX	3.5	11	4500	\$345
HDMAX003	DIAMOND MAX*	2.5	10	5400	\$335
HDMAX004	DIAMOND MAX*	5.1	10	5400	\$545
HDMAX004	DIAMOND MAX*	3.2	10	5400	\$349

Seagate

3.5" EIDE HD DRIVES

Code	Model	Cap. GB	Int.	Seek ms	Motor RPM	Cache	Price
HDSGT001	MEDALIST	2.1	ATA-3	12.5	4500	128K	\$315
HDSGT002	MEDALIST	3.2	ATA-2	12.5	4500	128K	\$365

Seagate

3.5" ULTRA-SCSI HD DRIVES

Code	Model	Cap. GB	Seek ms	Motor RPM	Cache	Price
HDSGT006	HAWKE 2XL	2.1	9	5400	512K	\$595
HDSGT003	BARRACUDA	2.1	9	7200	512K	\$950
HDSGT004	BARRACUDA	4.3	9	7200	512K	\$1250
HDSGT005	BARRACUDA	9.1	9	7200	512K	\$2095

Quantum

3.5" FIREBALL ST - SERIES

Leading Desktop Capacities - up to 6.4GB in a 3.5" form factor with Quantum's new Patented Ultra ATA support (Ultra DMA/33)

Code	Model	Cap. GB	Int.	Seek ms	Motor RPM	Cache	Price
HDQTM008	FIREBALL ST	1.6	U/ATA	10	5400	128K	\$265
HDQTM012	FIREBALL ST	2.1	U/ATA	10	5400	128K	\$315
HDQTM009	FIREBALL ST	3.2	U/ATA	10	5400	128K	\$365
HDQTM010	FIREBALL ST	4.3	U/ATA	10	5400	128K	\$429
HDQTM011	FIREBALL ST	6.4	U/ATA	10	5400	128K	\$595

Quantum

3.5" SCSI-3 HD DRIVES

Code	Model	Cap. GB	Seek ms	Motor RPM	Cache	Price
HDQTM015	FIREBALL ST	2.1	10	5400	128K	\$395
HDQTM016	FIREBALL ST	3.2	10	5400	128K	\$495
HDQTM017	FIREBALL ST	4.3	10	5400	128K	\$625
HDQTM018	FIREBALL ST	6.4	10	5400	128K	\$1250
HDQTM005	ATLAS II U/W	4.5	8	7200	512K	\$1295
HDQTM006	ATLAS II U/W	9.1	8	7200	1024K	\$1995

FUJITSU

EIDE HD DRIVES

Code	Model	Cap. GB	Price
HDFUJ001	FUJITSU	1.7	\$245
HDFUJ002	FUJITSU	2.1	\$295
HDFUJ003	FUJITSU UDMA	2.6	\$315
HDFUJ004	FUJITSU UDMA	3.5	\$375
HDFUJ005	FUJITSU UDMA	4.3	\$425

FLOPPY DRIVES/DISKETTES

Code	Model	Price
FDSON000	SONY 3.5" 1.44MB FLOPPY DRIVE	\$45
FDPAN000	PANASONIC 1.44MB FLOPPY DRIVE	\$45
DKGEN000	1.44MB 3.5" DISKETTES (10 PER PACK)	\$10
FDMIT000	MITSUBISHI 1.44MB F DRIVE	\$45



iomega PRODUCTS

Code	Model	Price
BUIOM000	ZIP DRIVE EXT. (PARALLEL PORT) - 100MB	\$235
BUIOM001	ZIP DRIVE EXT. (SCSI PORT) - 100MB	\$235
BUIOM002	ZIP DRIVE INT. 3.5 (INC. SCSI CARD) - 100MB	\$235
BUIOM003	JAZZ DRIVE (SCSI EXT.) - 1.0GB	\$670
BUIOM004	JAZZ DRIVE (SCSI INT.) - 1.0GB	\$505
BUIOM005	100MB PC ZIP DISKS (3 PER PACK)	\$69
BUIOM006	100MB PC ZIP DISKS (10 PER PACK)	\$225
BUIOM007	100MB ZIP INT IDE	\$185
BUIOM008	JAZZ MEDIA 1GB PC DISKS (3 PER PACK)	\$465
BUIOM009	JAZZ MEDIA 1GB MAC DISKS (3 PER PACK)	\$465
BUIOM013	IOMEGA TRAVELLOR	\$75
BUIOM015	ZIP ZOOM SCSI ISA CARD	\$85



TAPE BACK UNITS

Code	Model	Price
BUSON000	SONY DAT DRIVE 2/4 GB INT.	\$1290
BUSON001	SONY DAT DRIVE 4/8 GB INT.	\$1350
BUBAC000	BACKPACK 800MB EXT.	\$290
BU3M0000	3M TRAVAN TR-1 400/800MB	\$245
BUXA000	EXABYTE TR-41 INT.	\$545

TAPE CARTRIDGE

Code	Model	Price
BUGEN000	QIC80 DC2120 120MB/250MB COMP	\$35
BUGEN001	QIC-3020 MC300XL 680MB/1.36GB COMP	\$45
BUGEN002	QIC-WIDE 520 200MB/400MB COMP	\$45
BUGEN003	TARVAN TR-1 400MB/800MB COMP	\$49
BUGEN004	TARVAN TR-2 800MB/1.6GB COMP	\$55
BUGEN005	TARVAN TR-3 1.6GB/2.3GB COMP	\$59
BUGEN006	TARVAN TR-4 4GB/8GB COMP	\$65
BUGEN007	4MM DAT DDS-1 90M 2GB/4GB COMP	\$35
BUGEN008	4MM DAT DDS-2 120M 4GB/8GB COMP	\$39

GRAPHICS CARD & MONITORS

DISPLAY CARDS

GENERAL

Code	Model	Price
DCGEN000	1MB TRIDENT ISA SVGA	\$49
DCGEN001	1MB S3 PCI (UP TO 2MB)	\$55
DCGEN003	1MB EDO DRAM for S3	\$25
DCGEN002	TSENG LABS ET-6000 PCI, 2MB (UP TO 4MB)	\$90
DCGEN004	2MB DRAM Upgrade for ET-6000	\$75

DIAMOND STEALTH

Code	Model	Price
DCDIA000	3D-2000XL 2MB (UP TO 4MB) DRAM 64 BIT	\$155
DCDIA001	3D-3000XL 2MB (UP TO 4MB) VRAM 64 BIT	\$295
DCDIA002	2MB DRAM UPGRADE FOR 3D - 2000XL	\$45
DCDIA003	D-Stealth 3D PRO 2M	\$155
DCDIA006	DIAMOND VIPER V330 4M PCI	\$395
DCDIA007	DIAMOND VIPER V330 4M AGP	\$395

matrox

Code	Model	Price
DCMAT000	2MB MYSTIQUE PCI 64Bit 3D ACCEL.	\$175
DCMAT016	4MB MYSTIQUE 220 PCI 64Bit 3D ACCEL.	\$295
DCMAT009	2MB MEMORY UPGRADE FOR MYSTIQUE	\$125
DCMAT010	4MB MEMORY UPGRADE FOR MYSTIQUE	\$195
DCMAT008	6MB MEMORY UPGRADE FOR MYSTIQUE	\$345
DCMAT002	2MB MILLENNIUM PCI 64Bit	\$290
DCMAT013	4MB MILLENNIUM II PCI 64Bit with new 3D Functionality	\$399
DCMAT004	8MB MILLENNIUM II PCI 64Bit with new 3D Functionality	\$675

Code	Model	Price
DCMAT014	8MB MEMORY UPGRADE FOR MILLENNIUM II	\$445
DCMAT015	12MB MEMORY UPGRADE FOR MILLENNIUM II	\$595
DCMAT011	RAINBOW RUNNER FOR MILL II AND MYSTIQUE 220	\$495



GRAPHIC ACCELERATORS

Code	Model	Price
MMDIA000	DIAMOND 3D MONSTER 4MB EDO	\$299
MMCRE007	CREATIVE 3D BLASTER PCI 4MB EDO	\$275
MMGEN017	ORCHID RIGHTEOUS 3DFX 4 MB EDO	\$295

MONITORS

GENERAL

Code	Model	Price
MOGEN000	14" SVGA 0.28DP - 1024x768	\$299
MOGEN001	15" SVGA 0.28DP - 1280x1024	\$395



Code	Model	Price
MOMAG001	DX-1495 14" SVGA 0.28DP - 1024x768	\$325
MOMAG002	DJ-530 15" XGA 0.28DP - 1280x1024*	\$455
MOMAG004	AX-1595 15" XGA 0.28DP - 1280x1024*	\$495
MOMAG003	DJ-707 17" XGA 0.26DP - 1280x1024*	\$960
MOMAG005	DJ-717 17" CAD 0.26DP - 1600x1280*	\$1150



MOMAG006	MX-21F 21" CAD XGA 0.28DP - 1600x1280	\$2350
	*ON SCREEN DISPLAY **MULTIMEDIA & SPEAKERS	

Acer

Code	Model	Price
MOACE001	VIEW 34T 14" N.I DIG. 1024x768	\$335
MOACE002	VIEW 54E 15" N.I DIG. 1024x768	\$425
MOACE003	VIEW 56C 15" N.I DIG. 1280x1024	\$565
MOACE004	VIEW 76C 17" N.I DIG. 1280x1024	\$799
MOACE005	VIEW 78IE 17" N.I DIG. 1600x1200	\$995
MOACE006	PRESTIGE 211A 21 N.I DIG. 1600x1200	\$2720

NEC

Code	Model	Price
MONEC000	C500 15" SVGA 0.28DP 1024x768 (75Hz)	\$475
MONEC001	E500 15"	\$675
MONEC002	M500 15" MULTIMEDIA	\$695
MONEC003	E700 17" 1600x1200	\$1299
MONEC004	M700 17" MULTIMEDIA	\$1395
MONEC005	A700 17"	\$1190
MONEC006	E1100 21" 1180x1024 (60Hz)	\$3150
MONEC007	P1150 21" 1600x1200 (70Hz)	\$3790

SONY

Code	Model	Price
MOSON000	CPD-100SF 15" SVGA DIG. M/SCAN TRINITRON	\$675
MOSON001	CPD-200SF 17" SVGA DIG. M/SCAN TRINITRON	\$1390
MOSON002	CPD-300SF 20" SVGA DIG. M/SCAN TRINITRON	\$2995

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MULTIMEDIA & INTERNET

CD ROM WRITERS/DVD DRIVES

Code	Model	Price
MMRIC000	RICOH MP6200S CD-RW SCSI KIT	\$795
MMRIC003	RICOH CD-RW MEDIA	\$45
MMGEN016	COMPRO INTERNAL CD WRITER 4XW / 8XR	\$975
MMTRA000	TRAXDATA CD WRITER 4XW / 6XR	\$995
MMHPD000	HP SURESTORE 7100I CD WRITER	\$799
MMYAM000	YAMAHA CDR400 SCSI INTERNAL	\$990
MMYAM001	YAMAHA CDR400 SCSI EXTERNAL	\$1150
MMSAM001	SAMSUNG DVD KIT DRIVE WITH M PEG	\$1090
MMCRE016	CREATIVE PC DVD ENCORE DXR2 KIT	\$735
MSKOD000	KODAK GOLD BLANK CD	\$6
MMCRE020	CREATIVE CD-R 2X WRITE 6X READ DRIVE	\$875
MMCRE021	CREATIVE NOMAI 680.RW 2X WRITE 2X REWRITE 6X READ DRIVE	\$1075

MIRO VIDEO PRODUCTS

Code	Model	Price
MMMIRO00	MIRO TV TUNER CARD	\$299
MMMIRO01	MIRO DC10 VIDEO EDITING INC.MEDIA STUDIO 2.5VE,PCS BUS	\$675
MMMIRO02	MIRO DC30 PLUS PRO VIDEO EDITING INC. ADOBE PREMIER 4.2	\$1995

VIDEO CONFERENCE

Code	Model	Price
MMCRE006	CREATIVE VIDEO CONF. KIT (CAMERA NOT INC.)	\$315
MMCRE015	CREATIVE COMPACT VIDEO CONFERENCING CCD CAMERA	\$235

MODEMS

Code	Model	Price
FMBAN000	WAVE SP 33.6 D/F/V (SVD)	\$229
FMBAN001	MY-VOICE MODEM 33.6/14.4 - V.34	\$315
FMBAN003	WAVE SP 56K D/F/V(SVD) K56 Flex	\$299

Code	Model	Price
FMNET000	IN-PLUS 33.6 SVD DATA/FAX/VOICE	\$195
FMNET001	ROADSTER ULTRA 33.6 DATA/FAX/VOICE	\$219
FMNET006	ROADSTER 56K EXT DATA/FAX K56 FLEX	\$265
FMNET012	ROADSTER 56K EXT ULTRA SVD K56 FLEX	\$275

Code	Model	Price
FMNEY007	INMODEM 56.6K INTERNAL FAX/DATA	\$235
FMNET005	MEMORY MODEM 33.6K FAX/MODEM	\$465
FMNET004	SMART MODEM 33.6K WITH DES SECURITY, FAX/MODEM	\$375

Code	Model	Price
FMROB001	SPORTSTER V.34 EXT.	\$199
FMROB002	SPORTSTER V.34+ 33.6 INT. (S/P)*	\$195
FMROB004	WORLDPORT V.34+ PCMCIA	\$399
FMROB005	COURIER V.34+ 33.6 DATA (U TO 56.6K)	\$449
FMROB006	SPORTSTER FLASH EXT 56K X2	\$275

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CD ROM DRIVES

GENERAL

Code	Model	Price
MMGEN004	12X SCSI CDROM DRIVE	\$225
MMGEN010	GENERIC 24X CDROM DRIVE	\$165
MMCRE003	CREATIVE 16X CD ROM	\$175
MMCRE004	CREATIVE 24X CD ROM	\$185
MMPAN000	PANASONIC 24X CD ROM DRIVE	\$185
MMCRE019	CREATIVE PCP PORTABLE 8X CD-ROM DRIVE	\$485

Acer

Code	Model	Price
MMACE002	16X CDROM DRIVE (CD616P)	\$145
MMACE003	18X CDROM DRIVE (CD616A)	\$165
MMACE004	20X CDROM DRIVE (CD920E)	\$169
MMACE005	24X CDROM DRIVE	\$175

SOUND CARDS

Code	Model	Price
MMGEN005	GENERIC 16 BIT SOUND CARD - PnP	\$45
MMCRE011	SOUND BLASTER AWE-64 VALUE S/C PnP	\$169
MMCRE012	SOUND BLASTER AWE-64GOLD S/C -PnP	\$375
MMCRE017	AWE64/GOLD 4MB MEMORY MODULE	\$95
MMCRE018	AWE64/GOLD 8MB MEMORY MODULE	\$145
MMCRE019	AWE64/GOLD 28MB MEMORY MODULE	\$485
MMCRE013	SOUND BLASTER VIBRA16-PnP	\$95
MMDIA001	DIAMOND MONSTER SOUND CARD	\$245



MICROPHONES & SPEAKERS

JAZZ

Code	Model	Price
MMJAZ000	JAZZ J211 25W SPEAKERS	\$30
MMJAZ001	JAZZ J100 100W 3D SPEAKERS	\$75
MMJAZ002	JAZZ J200 200W 3D SURROUND SOUND SPEAKERS	\$89
MMJAZ003	JAZZ J300 300W 3D SURROUND SOUND SPEAKERS	\$99
MMJAZ004	JAZZ 900 SUB WOOFER - 300W	\$99
MMJAZ005	JAZZ J903R COMBO - 428W (TWO 128W SATELLITE SPEAKERS + 300W SUB WOOFER)	\$145
MMJAZ006	JAZZ J318 50W SPEAKERS WITH BASS BOOST	\$65
MMJAZ007	JAZZ SM20 OEM DESKTOP MIC.	\$15
MMJAZ008	JAZZ S124 RETAIL DESKTOP MIC.	\$20
MMJAZ009	JAZZ HS14 RETAIL STEREO HEADSET & MIC. PACK	\$25
MMJAZ010	JAZZ BUNDLE 1 MECH WARRIOR II + ZORK NEMESIS + MIC.	\$35
MMJAZ011	JAZZ BUNDLE 2 2 X REMOTE GAME PADS + STREET FIGHTER II TURBO	\$55

PROCESSORS



Code	Model	Price
CPINT000	486 DX 4-100 O/D . . .	\$95
CPINT005	Pentium 166MMX . . .	\$245
CPINT006	Pentium 200MMX . . .	\$435
CPINT007	Pentium Pro 180 . . .	\$695
CPINT008	Pentium Pro 200 . . .	\$950
CPINT009	Pentium II 233 . . .	\$795
CPINT010	Pentium II 266 . . .	\$995
CPINT011	Pentium II 300 . . .	\$1390
CPINT012	Pentium 233MMX . . .	\$575



CPAMD003	AMD K6-200	\$335
CPAMD004	AMD K6-233	\$545
CPAMD005	AMD K6-166	\$245



CPIBM003	686-200+	\$129
CPIBM004	M2-166MHZ	\$275
CPIBM005	M2-200MHZ	\$375
CPIBM006	M2-233MHZ	\$575

CONTROLLER ADAPTERS

Code	Model	Price
CCGEN000	ISA MULTI I/O FAST UART -16550\$35	
CCGEN001	ADAPTEC 152X SCSI CARD	\$165
CCGEN002	ADAPTEC 1542CP SCSI CARD	\$335
CCGEN003	ADAPTEC 2940 PCI SCSI CARD	\$290
CCGEN004	ADAPTEC 2940 ULTRA SCSI	\$299
CCGEN005	ADAPTEC 2940 ULTRA WIDE SCSI	\$375

MEMORY

Code	Model	Price
RAGEN000	4MB SIMM 72Pin 60ns	\$42
RAGEN001	8MB SIMM 72Pin 60ns	\$59
RAGEN002	16MB SIMM 72Pin 60ns	\$110
RAGEN003	32MB SIMM 72Pin 60ns	\$235
RAGEN004	8MB SIMM EDO 72Pin 60ns	\$55
RAGEN005	16MB SIMM EDO 72Pin 60ns	\$79
RAGEN006	32MB SIMM EDO 72Pin 60ns	\$165
RAGEN019	64MB SIMM EDO 72Pin	\$495
RAGEN020	128MB Simm EDO 72Pin	\$945
RAGEN007	16MB DIMM 168Pin	\$139
RAGEN008	32MB DIMM 168Pin	\$189
RAGEN009	64MB 168Pin DIMM	\$495
RAGEN010	4MB 32Pin SIMM	\$45
RAGEN011	4MB 72Pin Parity	\$75
RAGEN012	8MB 72Pin Parity	\$115
RAGEN013	16MB 72Pin Parity	\$155
RAGEN014	1MB SIMM 32 Pin	\$16
RAGEN018	64MB SIMM 72Pin	\$545

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DELUXE AT/ATX MDTOWER CASE
code: CA-ADE009

\$85
ADE DELUXE MINI-TOWER CASE
code: CA-ADE010

CASES

Code	Model	Price
CAADE000	ADE MINI-TOWER CASE	\$65
CAADE010	ADE DELUXE MINI-TOWER CASE	\$85
CAADE001	ADE DESKTOP CASE	\$69
CAADE002	ADE MIDI-TOWER CASE	\$95
CAADE009	ADE DELUXE AT/ATX MIDI-TOWER CASE	\$135
CAADE003	ADE FULL-TOWER CASE	\$139
CAADE004	ADE ATX MID CASE	\$135
CAADE005	ADE SERVER FULL TOWER 300W	\$195
CAADE006	300W SERVER SQUARE CASE	\$295
CAADE007	SCSI EXT. HD CASE	\$155
CAADE008	CD ROM EXT. PARALLEL CASE	\$155
CAMAC000	MACASE MINITOWER	\$125
CAMAC001	MACASE MID CASE	\$195
CAMAC002	MACASE FULL TOWER	\$235
CAMAC003	MACASE ATX MINI CASE	\$175

*ALL Cases include Power Supplies

POWER SUPPLIES

Code	Model	Price
PSGEN000	200W POWER SUPPLY	\$45
PSGEN001	300W POWER SUPPLY	\$95
PSGEN002	200W ATX POWER	\$55
PSAPC000	APC BACK-UPS 400	\$325
PSAPC001	APC BACK-UPS PRO 420	\$450
PSAPC002	APC BACK-UPS PRO 650	\$530
PSAPC003	APC SMART-UPS 700	\$695

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PRINTERS

Canon BUBBLE JET

Code	Model	Price
PRCAN000	BJC80 - Colour portable printer & scanner	\$490
PRCAN002	BJC-210SP - COL. A4 360X360 DPI, 248 CPS	\$225
PRCAN010	BJC-240 - COL. A4 360X360 DPI, 248 CPS PR	\$299
PRCAN003	BJC-4200 - COL. A4 720X360 DPI, 510 CPS PR	\$370
PRCAN004	BJC-620 - COL. A4 720X720 DPI, 300 CPS	\$599
PRCAN005	BJC-4550 - COL. A3 720X360 DPI, 510 CPS PR	\$675
PRCAN012	BJC-7000 Photo Realism, 1200 DPI, P-POP Printing	\$720

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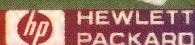
\$225
CANON
BJC-210SP

Canon LASER

Code	Model	Price
PRCAN009	LBP 1260 ,600 DPI 12PPM PCL5E 250/100 TRAYS 6MB	\$1650
PRCAN011	LBP 660,600 DPI 6PPM FAST WINDOWS PRINT	\$499



\$675
CANON BJC-4550
UP TO A3 SIZE



Code	Model	Price
PRHPD000	DESKJET 340, Portable with BONUS COLOUR KIT	\$465
PRHPD001	DESKJET 400, OPTIONAL COLOUR KIT	\$275
PRHPD002	DESKJET 670C, 600DPI, COLOUR	\$345
PRHPD003	DESKJET 690C, 600DPI, COLOUR	\$415
PRHPD021	DESKJET 692C, 600DPI, PHOTO COLOUR KIT	\$425
PRHPD004	DESKJET 820CXI, 600DPI, COLOUR	\$545
PRHPD005	DESKJET 870CXI, 600DPI, COLOUR PC/MAC	\$645
PRHPD006	DESKJET 1600C, 600DPI, COLOUR, PRO. RESULTS	\$2210
PRHPD007	DESKJET 1600CM, 800DPI, COLOUR, PC/MAC/Network	\$3225
PRHPD022	DESKJET 1000CXI A3	\$755
PRHPD008	OFFICEJET PRO 350	\$895
PRHPD020	OFFICEJET PRO 1150C	\$1445

Code	Model	Price
PRPHD009	LASERJET 6L, 600DPI, 6PPM	\$675
PRPHD010	LASERJET 6P, 600DPI, 8PPM, 2MB RAM	\$1185
PRPHD011	LASERJET 6MP, 600DPI, 8PPM, PC/MAC *	\$1495
PRPHD023	OFFICEJET 590C, 4 IN 1 MULTI-FUNCTION	\$795

*DENOTES POSTSCRIPT

EPSON

Code	Model	Price
PREPS000	STYLUS COL. 200, 720X360 DPI, 240CPS	\$275
PREPS001	STYLUS COL. 400, 720X720 DPI, 3PPM, WIN COMP.	\$395
PREPS002	STYLUS COL. 600, 1440X720 DPI, 3PPM, WIN COMP.	\$495
PREPS003	STYLUS COL. 800, 1440X720 DPI, 7PPM	\$729
PREPS011	STYLUS PHOTO COLOUR 720X720	\$795
PREPS005	STYLUS COL. PRO XL, 720X720 DPI FULL BLEED A3	\$1915
PREPS010	STYLUS COL. 1520 1440X720 DPI	\$1695
PREPS007	LQ-570+ 24PIN MATRIX	\$575



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INPUT DEVICES

KEYBOARDS

GENERAL

Code	Model	Price
IOGEN000	ENHANCED 104/WIN95	\$30
IOGEN001	HONEYWELL GENUINE - 104/WIN95	\$45
IOGEN010	GENERIC PS/2 Keyboard	\$45

Acer

Code	Model	Price
IOACE002	ACCUFEEL 104 KEY GENERIC RUBBER	\$35
IOACE000	FUTURE ERGO. WIN95 (with touch pad)	\$125
IOACE001	ACER AIR-KEY WIRELESS KEYBOARD	\$130



MICE

Code	Model	Price
IOGEN004	GENERIC 3 BUTTON MOUSE	\$15
IOMST003	MICROSOFT INTELLI-MOUSE	\$95
IOMST004	GENIUS 3 BUTTON MOUSE - SER./PS2	\$25
IOLOG000	LOGI-TECH 3 BUTTON DELUXE MOUSE	\$35

SCANNERS

GENERAL

Code	Model	Price
IOGEN008	OPTICPRO 4830P 30 BIT FLATBED SCANNER 4800DPI	\$249
IOGEN009	OPTICPRO 9630P 30 BIT FLATBED SCANNER 9600DPI	\$299
IOACE003	ACERSCAN 300F 24 BIT-4800 DPI	\$299
IOACE004	ACERSCAN 610 PLUS 30 BIT-9600 DPI	\$499



Code	Model	Price
IOHPD001	5P FLATBED COLOUR SCANNER, 300DPI & 24BIT	\$465
IOHPD011	6100C PROFESSIONAL COLOR SCANNER, 600DPI & 30BIT	\$1245
IOHPD004	4CSE FLATBED COLOR SCANNER WITH CORELWEB SOFTWARE	\$1345

JOYSTICKS & GAME PADS

Code	Model	Price
IOMST005	M/SOFT SIDEWINDER 3D PRO DIG. + GAME	\$125
IOMST007	M/SOFT SIDEWINDER GAME PAD	\$75
IOLOG001	L/TECH WINGMAN WARRIOR	\$149

NETWORKING

Code	Model	Price
NW3C0000	3COM ETHERLINK III ISA RJ45 3C509B-TPO	\$155
NW3C0001	3COM ETHERLINK III ISA 3C509B-COMBO	\$205
NW3C0002	3COM ETHERLINK III ISA RJ45/10B5AU1	\$185



NW3C0003	3COM ETHERLINK XLPCI 3C900-TPO	\$185
NW3C0004	3COM ETHERLINK XL PCI 3C900-COMBO	\$220
NW3C0005	3COM FAST ETHERLINK XL PCI 10/100BT	\$185
NW3C0006	3COM FAST ETHERLINK ISA 10/100TX 3C515TX	\$265
NW3C0007	3COM PCMCIA ETHERLINK III 3C589D-TP	\$229
NW3C0008	3COM PCMCIA ETHERLINK III 3C589D-COMBO	\$310
NW3C0009	3COM PCMCIA ETHERLINK III TP/33.6K F/M	\$550
NW3C0010	3COM PCMCIA ETHERLINK III COMBO/33.6K/F/M	\$615
NW3C0011	3COM OFFICECONNECT 4 PORT UNM HUB	\$155
NW3C0012	3COM OFFICECONNECT 8 PORT UNM HUB	\$245
NW3C0014	3COM OFFICECONNECT 8 PORT HUB 100BASE-TX	\$1290
NW3C0015	3COM OFFICECONNECT 16 PORT UNM HUB	\$455

OTHER NETWORKING PRODUCTS

Code	Model	Price
NWGEN000	NE2000 COMPATIBLE ISA COMBO	\$40
NWGEN001	PCI NETWORK CARD COMBO	\$45
NWGEN002	MINI 5 PORT HUB	\$85
NWGEN003	GENERIC 8 PORT ETHERNET HUB	\$125
NWGEN004	GENERIC 16 PORT HUB	\$175
NWGEN005	PCMCIA ETHERNET BNC+RJ45	\$175
NWGEN006	POCKET ETHERNET PARRALLEL COMBO	\$189
NWGEN009	INTEL ETHEREXPRESS PRO/10 PCI TP (RJ45)	\$115
NWGEN010	INTEL ETHEREXPRESS PRO PCI 10/100TX (RJ45)	\$145
NWGEN011	ETHERNET TRANCEIVER AUI TO RJ45	\$65
NWGEN012	ETHERNET TRANCEIVER AUI TO BNC	\$65
NWGEN013	INTEL ETHERNET PRO PCI COMBO 10	\$165
NWGEN014	INTEL ETHERNET EXPRESS ISA COMBO 10	\$145
NWSMC000	SMC 8432 PCI RJ45	\$95
NWSMC001	SMC 8432 PCI COMBO	\$125
NWSMC002	SMC 9332 PCI 10/100 TP	\$145
NWSMC003	SMC ETHEREZ ISA COMBO	\$129
NWXIR000	XIRCOM PCMCIA 10BASE-2 (BNC)	\$285
NWXIR001	XIRCOM PCMCIA 10BASE-T (RJ45)	\$229
NWXIR002	XIRCOM PCMCIA ETHERNET COMBO	\$295
NWXIR003	XIRCOM PCMCIA FAST ETHERNET 10/100TX	\$329
NWXIR004	XIRCOM ETHERNET TP/MODEM 33.6K	\$495
NWXIR005	XIRCOM ETHERNET COMBO/MODEM 33.6	\$595



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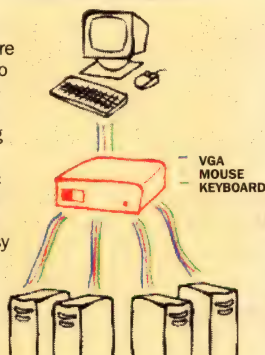
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DATA SWITCHES

CS-102/104/106 PC AUTO SWITCH

The ADE CS-104 and CS-106 CPU switches are useful for operating 2 to 6 computers from one keyboard, mouse and monitor. By connecting extension cables (vga m/f, mouse m/f & k/boad m/m) you can easily switch between computers with our easy to use software.



Code:
DS-ADE030
DS-ADE019
DS-ADE020

Great for Administrators who have several servers and also great for presentations. No need to buy several keyboards, monitors and mice. Use one keyboard, monitor and mouse for all your systems.

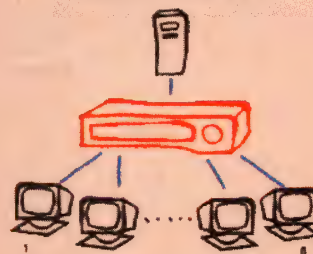
Features:

- Mouse emulation and keyboard emulation for automatic PC boot up
- Provides serial mouse and keyboard ports
- Three stage cascable with any model for accessing more computers
- Supports SVGA, VGA and Multisync monitors
- Selects any computer by **Hot Keys**, buttons
- Optional Foot Switch to select any computer (CS-106)
- Built-in buzzer for switching confirmation
- Keyboard and LED status recording and restored while switching among computers
- Auto Scan for monitoring PC periodically

Adelong's video splitters (VS-102/104/VS-108) are useful for displaying information from one computer onto several monitors. They enhance video signals through long distance broadcasting of up to 65m (210 feet). The daisy chain feature enables you to chain as many monitors as you want with minimum cost.

VS-102/104/108 VIDEO SPLITTER

Code:
DS-ADE000
DS-ADE001
DS-ADE002



Features:

- Duplicate video signals to two/four/five/eight video outputs
- Gain control switch for optimum picture quality
- Transmission distance: 65m (210 feet)
- Power-save mode when computer is off
- Suitable for SVGA, VGA and multisync monitors
- Daisy chainable

Item Code	Description	Base/Sales Price
DS-ADE000	VS-102 2 WAY VIDEO SPLITTER (see top picture for details)	\$79.00
DS-ADE001	VS-104 4 WAY VIDEO SPLITTER (see top picture for details)	\$115.00
DS-ADE002	VS-108 8 WAY VIDEO SPLITTER (see top picture for details)	\$155.00
DS-ADE003	IC-100, SERIAL/PARALLEL BIDIRECTION CONVERTOR. ALLOWS PARALLEL SIGNALS TO TRAVEL OVER LONGER DISTANCE. BAUD RATE 300-38400 BPS	\$95.00
DS-ADE004	IC-485, RS232 TO RS485/RS422 BIDIRECTIONAL CONVERTOR. DATA RATE, 1200M/UNDER 100K BPS	\$65.00
DS-ADE005	IC-162T, NON POWERED PARALLEL LINE EXTENDER. TRANSMITTER. UP TO 610M	\$50.00
DS-ADE006	IC-164R, NON POWERED PARALLEL LINE EXTENDER. RECEIVER. UP TO 610M	\$50.00
DS-ADE007	MP451, NON POWERED 4 COMPUTER SHARE 1 PRINTER AUTO SWITCH	\$35.00
DS-ADE008	AS811P, 8 COMPUTER SHARE 1 PRINTER AUTO SWITCH	\$120.00
DS-ADE009	MS-104, MODEM SHARING AUTO SWITCH. CABLE DISTANCE, 15M MAX. 4 COMPUTERS SHARE 1 MODEM	\$145.00
DS-ADE010	AS402, 4 COMPUTER SHARE 2 PRINTER AUTO SWITCH. SOFTWARE INCLUDED. MAX 6M	\$130.00
DS-ADE011	AS-411S, 4 COMPUTER SHARE 1 PRINTER SERIAL AUTO SWITCH. WITH BUFFER. 15M MAX. FCC APPROVED	\$95.00
DS-ADE012	AS-811S, 8 COMPUTER SHARE 1 PRINTER SERIAL AUTO SWITCH. WITH BUFFER. 15M MAX. FCC APPROVED	\$155.00
DS-ADE013	AS-152P, 2 COMPUTER/1 PRINTER OR 2 PRINTER/1 COMPUTER BIDIRECTION AUTO SWITCH. 6M MAX	\$55.00
DS-ADE014	AS-154P, 4 COMPUTER/1 PRINTER OR 4 PRINTER/1 COMPUTER BIDIRECTION AUTO SWITCH. 6M MAX	\$65.00
DS-ADE015	AS-451S, 4 TO 1 SERIAL AUTO SWITCH. 4 COMPUTER SHARE 1 PRINTER. 15M MAX	\$45.00
DS-ADE016	SP-200, NON POWERED SERIAL TO PARALLEL CONVERTOR. 150-19200BPS	\$55.00
DS-ADE017	PS-200, NON POWERED PARALLEL TO SERIAL CONVERTOR. 150-19200BPS	\$55.00
DS-ADE018	IE-488P, IEEE-488 TO CENTRONIC CONVERTOR	\$95.00
DS-ADE019	CS-104 PC AUTO SWITCH (see top picture for details)	\$375.00
DS-ADE020	CS-106 PC AUTO SWITCH (see top picture for details)	\$395.00
DS-ADE021	MP-201, PRINTER AUTO SWITCH	\$35.00
DS-ADE022	ECD-108, CD-ROM EXTERNAL CASE, PARALLEL PORT, 260 x 203 x 65 MM, 1130G,	\$175.00
DS-ADE023	MS-201N 2 TO 1 SERIAL AUTO SWITCH	\$35.00
DS-ADE024	EH132, 3.5" PORTABLE HARD DISK CASE, CAPACITY 40MB-8.4 GB. 230 x 130 x 43 MM. 750G. 300K BPS	\$165.00
DS-ADE025	EH100, 2.5" PORTABLE HARD DISK CASE, CAPACITY 40MB-8.4 GB, 137 x 76 x 32 MM. 150G. 300K BPS	\$145.00
DS-ADE026	2 TO 1 MANUAL PRINTER SWITCH DB25	\$25.00
DS-ADE027	4 TO 1 MANUAL PRINTER SWITCH DB25	\$35.00
DS-ADE028	2 TO 1 PC MANUAL SWITCH	\$29.00
DS-ADE029	4 TO 1 PC MANUAL SWITCH	\$39.00
DS-ADE030	CS-102 PC AUTO SWITCH (see top picture for details)	\$245.00
DS-ADE031	SWCN36 2 TO 1 MANUAL PRINTER SWITCH CENTRONIC	\$25.00
DS-ADE032	AS251S, NON POWERED 2 TO 1 SERIAL AUTO SWITCH. ENABLES 2 COMPUTER SHARE 1 PRINTER. 15M MAX	35.00
DS-ADE033	AS251P, NON POWERED 2 TO 1 PARALLEL AUTO SWITCH. AUTO FORMFEED SELECTION. 6M MAX	\$35.00
DS-ADE034	AS422P, 4 TO 2 CONCURRENT AUTO SWITCH BUFFER. 4 COMPUTERS SHARE 2 PRINTERS. 100KBPS/10M MAX	\$55.00
DS-ADE035	IC150, TRANSFER DATA AT DISTANCES OF UP TO 10KM/110BPS OR 800M/19200BPS. USING 4-WIRE FULL DUPLEX OR 2 WIRE SIMPLEX CABLE. FOR RS-232	\$55.00

CONSUMABLES



Canon

Item Code	Description	Price
IN-CAN000	BC01 BLACK INK FOR BJ10/20 SERIES	\$39.00
IN-CAN001	BC02 BLACK INK FOR BJ200/230/BJC210/240	\$39.00
IN-CAN002	BC05 COLOUR INK FOR BJC210/240	\$49.00
IN-CAN003	BC06 PHOTO INK FOR BJC240	\$49.00
IN-CAN004	BC06KIT PHOTO COLOUR KIT FOR BJC240	\$65.00
IN-CAN005	BC09F FLUORESCENT INK FOR BJC210/240	\$79.00
IN-CAN006	BC10 BLACK INK & HEAD FOR BJ30/BJC70	\$55.00
IN-CAN007	BC10BK BLACK INK FOR BJ30/BJC70	\$25.00
IN-CAN008	BC11 COLOUR INK & HEAD FOR BJC70	\$65.00
IN-CAN009	BC11BK BLACK INK FOR BJC70 (3 PACK)	\$19.00
IN-CAN010	BC11C COLOUR INK FOR BJC70 (3 PACK)	\$35.00
IN-CAN011	BC20 BLACK INK & HEAD FOR BJC4000 SERIES	\$49.00
IN-CAN012	BC21 COLOUR & BLACK INKHEAD BJC4000 SERIES	\$75.00
IN-CAN013	BC121BK BLACK INK FOR BJC4000 SERIES	\$25.00
IN-CAN014	BC121C TRI-COLOUR FOR BJC4000 SERIES	\$29.00
IN-CAN015	BC22 PHOTO INK FOR BJC4200/4500	\$75.00
IN-CAN016	BC22KIT PHOT KIT FOR BJC4200/4550	\$95.00
IN-CAN017	BC29F FLUORESCENT INK FOR BJC4000 SERIES	\$75.00
IN-CAN018	BJI201B BLACK INK FOR BJC600 SERIES	\$25.00
IN-CAN019	BJI201C CYAN INK FOR BJC600 SERIES	\$15.50
IN-CAN020	BJI201M MAGENTA INK FOR BJC600 SERIES	\$15.50
IN-CAN021	BJI201Y YELLOW INK FOR BJC600 SERIES	\$15.50
IN-CAN022	BJI642 BLACK INK FOR BJ300/330	\$29.00
IN-CAN023	BJI643BK BLACK INK FOR BJC800/880	\$45.00
IN-CAN024	BJI643C CYAN INK FOR BJC800/880	\$49.00
IN-CAN025	BJI643M MAGENTA INK FOR BJC800/880	\$49.00
IN-CAN026	BJI643Y YELLOW INK FOR BJC800/880	\$49.00
IN-CAN027	BJI801 INK FOR BJ80	\$35.00

EPSON

Item Code	Description	Price
IN-EPS000	S020002 BLACK FOR SQ850	\$79.00
IN-EPS001	S020003 BLACK FOR EPJ-200	\$59.00
IN-EPS002	S020010 BLACK INK FOR SQ-870, SQ-1170	\$59.00
IN-EPS003	S020025 BLACK FOR STYLUS 400/1000	\$30.00
IN-EPS004	S020034 BLACK INK FOR STYLUS COLOUR	\$55.00
IN-EPS005	S020036 COLOUR FOT FOR STYLUS COLOUR	\$79.00
IN-EPS006	S020047 BLACK INK FOR STYLUS 820, IIS	\$35.00
IN-EPS007	S020049 COLOUR FOR STYLUS II, IIS, 1500	\$45.00
IN-EPS008	S020062 BLACK INK FOR STYLUS 1500 XL+	\$59.00
IN-EPS009	S020066 COLOUR INK FOR STYLUS PRO XL+	\$85.00
IN-EPS010	S020089 COLOUR FOR STYLUS 400,600,800,1520	\$45.00
IN-EPS011	S020093 BLACK INK FOR STYLUS C500	\$35.00
IN-EPS012	S020097 COLOUR INK FOR STYLUS C500, 200	\$49.00
IN-EPS013	S020108 BLACK INK FOR STYLUS C800, 1520	\$45.00

HP HEWLETT PACKARD

Item Code	Description	Price
IN-HPD000	HP51633M BLACK FOR HP PORTABLE	\$39.00
IN-HPD001	HP51626A BLACK INK FOR HP 500 SERIES	\$39.00
IN-HPD002	HP51629A BLACK INK FOR 600 SERIES	\$39.00
IN-HPD003	HP51645A BLACK INK FOR HPB50C/1600	\$39.00
IN-HPD004	HP51640A BLACK INK FOR DJ1200 SERIES	\$39.00
IN-HPD005	HP51608A BLACK INK FOR HP PAINTJET XL	\$45.00
IN-HPD006	HP51639A BLACK INK FOR PAINTJET XL300	\$39.00
IN-HPD007	HP51625A COLOUR FOR DJ500 SERIES	\$44.50
IN-HPD008	HP51649A COLOUR INK FOR 600 SERIES	\$44.50
IN-HPD009	HP51641A COLOUR FOR DESKJET B50C/890C	\$45.00
IN-HPD010	HP51640C CYAN INK FOR DJ1200/1600 SERIES	\$44.50
IN-HPD011	HP51640M MAGENTA INK FOR DJ1200/1600 SERIES	\$44.50
IN-HPD012	HP51640Y YELLOW INK FOR DJ1200/1600 SERIES	\$44.50
IN-HPD013	HP COLOUR PHOTO KIT FOR HP690C	\$79.00
IN-HPD014	HP PHOTO COLOR CARTRIDGE 300/400/540	\$49.00

TONER CARTRIDGES

Item Code	Description	Price
TO-EPS000	EPSON EPL4000/4200 TONER S050002	\$235
TO-EPS001	EPSON EPL5500 TONER S050005	\$115
TO-EPS002	EPSON EPL7100/75400/800/7500 S051009	\$450
TO-EPS003	EPSON EPL3000 CARTRIDGE S051020	\$230
TO-EPS004	EPSON EPL5000/EPL5200 CARTR S051011	\$305
TO-HPD000	HP LASERJET II/III TONER HP92295A	\$125
TO-HPD001	HP LASERJET 4L/4ML/4P/4MP TONER HP92274A	\$115
TO-HPD002	HP LASERJET 5L TONER HP-C3906A	\$99
TO-HPD003	HP LASERJET IIP/IIIP/IIIP+ TONER 92275A	\$149
TO-HPD004	HP LASERJET 4SI/4SI MX/3SI TONER 92291A	\$220
TO-HPD005	HP LASERJET 5SI/5SI MX TONER HP-C3909A	\$325
TO-HPD006	HP LASERJET 4/4M/5/5N/5M TONER HP 92298Z	\$165
TO-HPD007	HP LASERJET 4V/4MV TONER HP-C3900A	\$275
TO-HPD008	HP LASERJET 5P/5MP/6P/6MP TONER	\$130
TO-OKI000	OKI OL400E/410E/810E TONER	\$39

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CABLES AND ADAPTORS



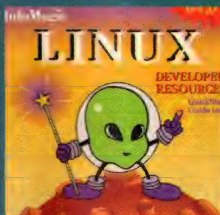
Item Code	Description	Price
Printer Cables		
CB-GEN000	6FT. PRINTER CABLE	\$5.00
CB-GEN001	3 METERS PRINTER CABLE	\$9.00
CB-GEN002	5 METERS PRINTER CABLE	\$12.00
CB-GEN003	10 METERS PRINTER CABLE	\$19.00
CB-GEN004	20 METERS PRINTER CABLE	\$25.00
CB-GEN088	1.8M IEEE1284 PRINTER CABLE	\$19.00
CB-GEN089	1.8M IEEE1284 PRINTER CABLE	\$20.00
DB25 Cables		
CB-GEN008	1.8M SERIAL DB25M/DB25M	\$9.00
CB-GEN009	3M SERIAL DB25M/DB25M	\$15.00
CB-GEN010	5M SERIAL DB25M/DB25M	\$17.00
CB-GEN011	10M SERIAL DB25M/DB25M	\$20.00
CB-GEN012	20M SERIAL DB25M/DB25M	\$25.00
CB-GEN013	1.8M SERIAL DB25M/DB25F	\$9.00
CB-GEN014	3M SERIAL DB25M/DB25F	\$12.00
CB-GEN015	5M SERIAL DB25M/DB25F	\$15.00
CB-GEN016	10M SERIAL DB25M/DB25F	\$17.00
CB-GEN017	20M SERIAL DB25M/DB25F	\$25.00
CB-GEN018	1.8M DB25F/DB25F	\$9.00
CB-GEN019	3M SERIAL DB25F/DB25F	\$12.00
CB-GEN020	5M SERIAL DB25F/DB25F	\$17.00
CB-GEN021	10M SERIAL DB25F/DB25F	\$20.00
CB-GEN022	20M SERIAL DB25F/DB25F	\$25.00
Keyboard & VGA Cables		
CB-GEN023	1.8M KEYBOARD EXT M/F	\$9.00
CB-GEN024	3M KEYBOARD EXT M/F	\$12.00
CB-GEN025	5M KEYBOARD EXT M/F	\$15.00
CB-GEN026	1.8M CURLY KB EXT M/F	\$10.00
CB-GEN027	1.8M PS/2 KB EXT M/F	\$12.00
CB-GEN028	1.8M PS/2 KEYBOARD M/M	\$12.00
CB-GEN029	1.8M KEYBOARD CABLE M/M	\$10.00
CB-GEN030	1.8M EGA/MOUSE EXT 9F/9M	\$9.00
CB-GEN031	1.8M EGA/MOUSE 9M/9M	\$9.00
CB-GEN032	1.8M VGA EXT 15M/15F	\$9.00
CB-GEN033	3M VGA EXT 15M/15F	\$15.00
CB-GEN034	5M VGA EXT 15M/15F	\$17.00
CB-GEN035	1.8M VGA CABLE 15M/15M	\$9.00
CB-GEN036	MONITOR SPLITTER 15M/15F*2	\$15.00
CB-GEN037	1.8M RGB CABLE 15M/BNC*5	\$25.00
CB-GEN082	5M VGA CABLE HD15M/HD15M	\$9.00
CB-GEN090	2M VGA TO EGA CABLE 9M/15M	\$9.00
SCSI Products		
CB-GEN042	1M CENT50M TO CENT50M SCSI	\$15.00
CB-GEN043	1.8M CENT 50M CENT 50M SCSI	\$17.00
CB-GEN044	1M CENT 50M/DB25M SCSI	\$15.00

Item Code	Description	Price
Adaptors		
CBGEN100	KEYBOARD ADAPTOR 5F/6M	\$9.00
CBGEN101	KEYBOARD ADAPTOR 5M/6F	\$9.00
CBGEN102	GENDER CHANGER DB25M/F	\$9.00
CBGEN103	GENDER CHANGER DB25F/F	\$9.00
CBGEN104	DB25M/DE9F ADAPTOR	\$9.00
CBGEN105	DB25F/DE9M ADAPTOR	\$9.00
CBGEN106	MIN DIN 6M/DE9M	\$9.00
CBGEN107	MIN DIN 6F/DE9F	\$9.00
CBGEN108	MIN DIN 6M/DE9F	\$9.00
CBGEN109	DE9F/HD15M ADAPTOR	\$9.00
CBGEN110	DE9M/HD15F ADAPTOR	\$9.00
CBGEN111	DE9M/HD15M ADAPTOR	\$9.00
CBGEN112	HD15M/HD15M ADAPTOR	\$12.00
CBGEN113	HD15F/HD15F ADAPTOR	\$12.00
CBGEN114	DE9M/DE9M ADAPTOR	\$9.00
CBGEN115	DE9F/DE9F ADAPTOR	\$9.00
CBGEN116	RJ45 TO DB25F CONNECTOR	\$6.00
CBGEN117	RJ45 TO DB 25M CONNECTOR	\$6.00
CBGEN118	RJ45 TO DB9F CONNECTOR	\$6.00
CBGEN119	RJ45 TO DB9M ADAPTOR	\$6.00
CBGEN120	DB25F/CN36M ADAPTOR	\$9.00
CBGEN121	DB25M/CN36F ADAPTOR	\$9.00
CBGEN122	DB25M/M NULL MODEM ADAP	\$12.00
CBGEN123	DB25/DE9F ADAPTOR	\$9.00
Others		
CBGEN006	1.8M 9F/25M MODEM CABLE	\$10.00
CBGEN007	1.6M 9F/25M/25F MODEM	\$15.00
CBGEN038	1.8M PARA LAPLINK DB25M/M	\$12.00
CBGEN039	5M PARA LAPLINK DB25M/M	\$15.00
CBGEN040	10M LAPLINK PAR DB25M/M	\$19.00
CBGEN041	3M LAPLINK SERIAL	\$15.00
CBGEN058	FLOPPY CABLES 780MM	\$6.00
CBGEN059	IDE CABLE 3 CONNECT	\$6.00
CBGEN061	INTERNAL POWER SPLITTER	\$5.00
CBGEN062	1.8M WALL TO PC POWER CABLE	\$6.00
CBGEN063	1.8M PC TO MONITOR POWER CABLE	\$7.00

Item Code	Description	Price
CB-GEN045	CENT 50M SCSI TERM ACTIVE	\$25.00
CB-GEN046	CENT 50M TERM/C50M/C50F	\$19.00
CB-GEN047	1M HONDA 50M/CENT 50M	\$25.00
CB-GEN048	1.8M HONDA50M/CENT50M	\$29.00
CB-GEN049	1M HONDA 50M/DB25 SCSI II	\$25.00
CB-GEN050	1M HONDA 50M/HONDA 50M	\$39.00
CB-GEN051	1M HONDA 68M/HONDA 68M	\$45.00
CB-GEN052	1M HONDA 68M/HON 50M	\$45.00
CB-GEN053	1M HONDA 68M/CENT 50M	\$45.00
CB-GEN054	HONDA 50M TERMINATOR ACT	\$25.00
CB-GEN055	HONDA 68M TERMINATOR ACT	\$39.00
CB-GEN056	INTERNAL TERMINATOR ACT	\$20.00
CB-GEN057	INTERNAL SCSI III	\$85.00
CB-GEN060	INT SCSI CABLE 7 CONNECT	\$15.00
CB-GEN083	HONDA 68 TO DB25 M SCSI III	\$45.00
Networking		
CB-GEN064	2M COAXIAL CABLE WITH BNC	\$9.00
CB-GEN065	5M COAXIAL CABLE WITH BNC	\$12.00
CB-GEN066	10M COAXIAL CABLE WITH BNC	\$15.00
CB-GEN067	20M COAXIAL CABLE WITH BNC	\$20.00
CB-GEN068	30M COAXIAL CABLE WITH BNC	\$25.00
CB-GEN069	50M COAXIAL CABLE WITH BNC	\$35.00
CB-GEN070	BNC TERMINATOR	\$3.50
CB-GEN071	BNC T CONNECTOR	\$3.50
CB-GEN072	1M RJ45 CABLE	\$8.00
CB-GEN073	2M RJ45 CABLE	\$10.00
CB-GEN074	5M RJ45 CABLE	\$15.00
CB-GEN075	8M RJ45 CABLE	\$19.00
CB-GEN076	10M RJ45 CABLE	\$20.00
CB-GEN077	15M RJ45 CABLE	\$25.00
CB-GEN078	20M RJ45 CABLE	\$30.00
CB-GEN079	25M RJ45 CABLE	\$35.00
CB-GEN080	30M RJ45 CABLE	\$39.00
CB-GEN081	40M RJ45 CABLE	\$45.00
CB-GEN084	2 METRE RJ45 CABLE-CROSS	\$12.00
CB-GEN085	3 METRE RJ45 CABLE-CROSS	\$15.00
CB-GEN086	5 METRE RJ45 CABLE-CROSS	\$19.00
CB-GEN087	10 METRE RJ45 CABLE-CROSS	\$25.00
CB-GEN091	0.5M RJ45 CABLE	\$7.00
CB-GEN092	3M RJ45 CABLE	\$12.00
CB-GEN093	3M COAXIAL CABLE WITH BNC	\$10.00
CB-GEN094	15M COAXIAL CABLE WITH BNC	\$18.00
CB-GEN095	8M COAXIAL CABLE WITH BNC	\$15.00
CB-GEN096	12 METERS COAXIAL CABLE BNC	\$18.00
CB-GEN097	18 METERS COAXIAL CABLE BNC	\$25.00

SOFTWARE

Code	Model	Price
Microsoft		
SWMST000	MICROSOFT WIN95 ON DISK-NEW USER	\$275
SWMST001	MICROSOFT WIN95 ON CD -UPGRADE	\$139
SWMST002	MICROSOFT WIN95 ON DISKETTE -UPGRADE	\$139
SWMST003	MICROSOFT WIN NT WORKSTATION 4.0 -NEW USER	\$399
SWMST004	MICROSOFT WIN NT WORKSTATION 4.0 -UPGRADE	\$169
SWMST005	MICROSOFT OFFICE 97 STD VERS. CD -NEW USER	\$629
SWMST006	MICROSOFT OFFICE 97 STD VERS. CD -UPGRADE	\$345
SWMST007	MICROSOFT OFFICE 97 PRO VERS. CD -NEW USER	\$759
SWMST008	MICROSOFT OFFICE 97 PRO VERS. CD -UPGRADE	\$439
SWMST009	MICROSOFT WORKS VER 4.0 FOR WIN95	\$95
SWMST010	MICROSOFT WORD 97 -NEW USER	\$319
SWMST011	MICROSOFT WORD 97 -UPGRADE	\$139
SWMST012	MICROSOFT EXCEL 97 -NEW USER	\$299
SWMST013	MICROSOFT EXCEL 97 -UPGRADE	\$139
SWMST014	MICROSOFT POWER POINT 97 -NEW USER	\$319
SWMST015	MICROSOFT POWER POINT 97 -UPGRADE	\$139
SWMST016	MICROSOFT ACCESS 97 -NEW USER	\$319
SWMST017	MICROSOFT ACCESS 97 -UPGRADE	\$139
SWMST018	MICROSOFT PUBLISHER 97 -NEW USER	\$95
SWMST019	MICROSOFT PUBLISHER 97 -UPGRADE	\$95
SWMST020	MICROSOFT FRONT PAGE 97 -NEW USER	\$139
SWMST021	MICROSOFT FRONT PAGE 97 -UPGRADE	\$65
SWMST022	MICROSOFT OUTLOOK 97	\$129
SWMST023	MICROSOFT VISUAL J++	\$149
SWMST024	MICROSOFT VISUAL C++ PRO V5	\$650
SWMST025	MS VISUAL BASIC PRO V5	\$645
SWMST026	MICROSOFT ENCARTA 97 I/ACTIVE ENCYCLOPEDIA	\$59
SWMST027	MICROSOFT ENCARTA 97 I/ACTIVE WORLD ATLAS	\$59
SWMST062	MICROSOFT ENCARTA 98 I/ACTIVE ENCYCLOPEDIA	\$75
SWMST042	MICROSOFT FLIGHT SIMULATOR	\$59
SWMST062	MICROSOFT ENCART 98	\$75
SWMST043	MS OFFICE 97 VALUE PACK	\$499
SWMST044	MS PROJECT WIN 95 DISK	\$590
SWMST045	MS PROJECT UPGRADE DK	\$195
SWMST048	MS WIN NT SERVER V4.5 USER	\$890
SWMST049	MICROSOFT NT USER LICENSE	\$60
SWMST051	MS HOME ESSENTIAL 97	\$149
SWMST052	MS OFFICE 97 SMALL BUSINESS ED.	\$355
SWMST058	MS TEAM MANAGER 97	\$595



Code	Model	Price
Accounting		
SWMY0000	M.Y.O.B FIRST ACCOUNTS	\$175
SWMY0001	M.Y.O.B ACCOUNTING	\$315
SWMY0002	M.Y.O.B ACCOUNTING WITH PAYROLL	\$485
SWMY0003	M.Y.O.B PREMIER 3 USERS	\$875
SWQK001	QUICK BOOK PRO	\$415
SWQK004	QUICK PAYROLL PRO	\$315
Symantec		
SWSYM000	SYMANTEC ACT! 3.0 (WIN 95/NT/3.5")	\$249
SWSYM003	SYMANTEC WINFAX PRO 7.5	\$125
SWSYM004	SYMANTEC PC ANYWHERE 32 7.5	\$209
SWSYM005	SYMANTEC NORTON 4 YOUR EYES 4.0 WIN95 3.5	\$125
SWSYM007	SYMANTEC NORTON ANTI VIRUS -WIN95	\$85
Graphic		
SWIMS000	IMSI MASTERCLIPS 150,000 PREM.	\$129
SWIMS001	IMSI TURBO CAD 2D/3D V3	\$149
SWIMS003	IMSI FLOOR PLAN PLUS 3D	\$69
SWFH000	FREE HAND GRAPHICS STUDIO V7 WIN95/NT CD	\$695
SWFH001	FREE HAND GRAPHICS STUDIO V7 WIN95/NT CD -UPG	\$299
SWADD000	ADOBE PAGEMAKER 6.5	\$979
SWADD001	ADOBE PAGEMAKER 6.5 UP	\$205
SWADD002	ADOBE ILLUSTRATOR 4.1	\$599
SWADD003	ADOBE PHOTOSHOP 4.0	\$979
SWADD004	ADOBE PHOTOSHOP 4.0 UP	\$305
SWADD005	ADOBE ACROBAT 3.0	\$299
SWCOR000	COREL DRAW 7.0	\$670
SWCOR001	COREL DRAW 7.0 U/G	\$379
SWAUT000	AUTODESK AUTOCAD LT -WINDOWS 95	\$779
SWQAK000	QUARK XPRESS	\$1825
Others		
SWCYB000	CYBER VET ANTI VIRUS	\$99
SWGEN000	INFORMAGIC LINUX 6CD LATEST VERSION	\$39
SWGEN001	REDHAT LINUX 6CD LATEST VERSION	\$39
SWMFE000	MCAFFEE VIRUS SCAN	\$79
SWMFE002	MCAFFEE WEBCAN V2 CD	\$45
SWOZ000	OZEMAIL INTERNET FAMILY PACK	\$29.95
SWOZ001	OZEMAIL INTERNET STARTER KIT	\$9.95

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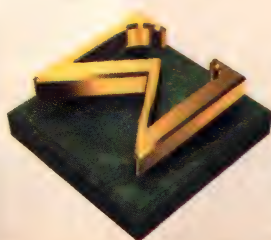


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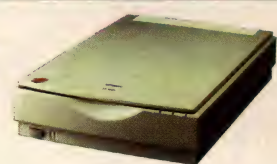
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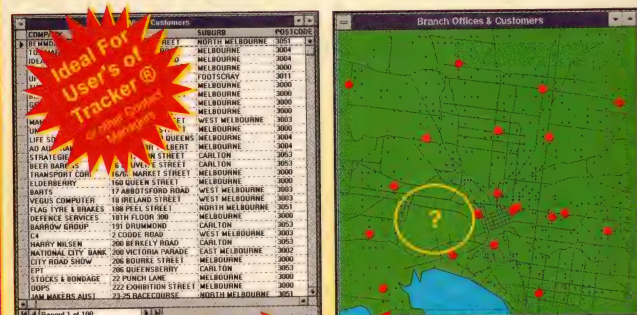
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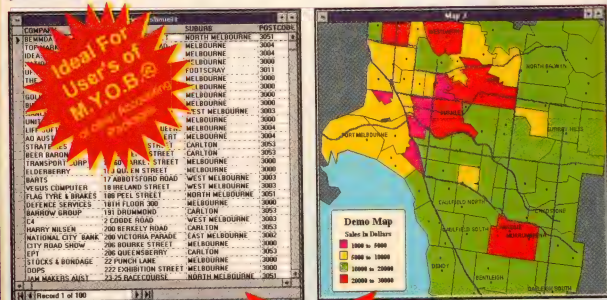
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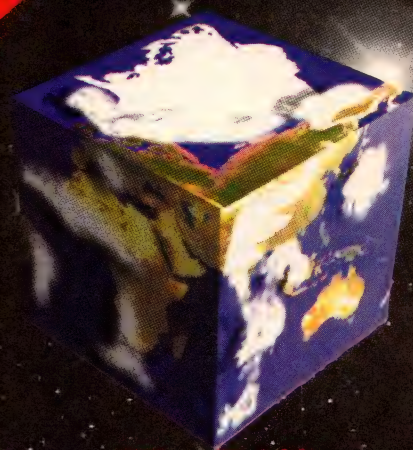
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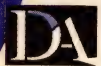
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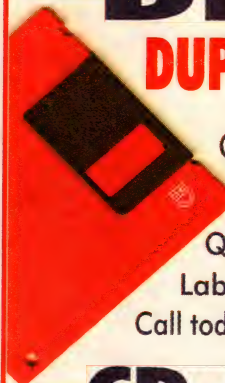
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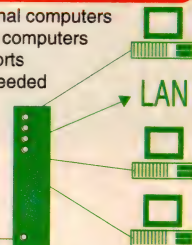
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- To provide fast, easy access to the files and resources we talk about in APC;
- To make it easy for our readers to get on the Internet so they can use our new interactive Web site;
- To provide cheap and convenient access to the most popular downloads.

Our usual kit contains browsers, file-transfer programs, Mail and News readers and much more for each of the major operating systems. To make it as easy as possible for readers to get online, we've also included reader offers and a sign-up kit.

Each month, **apcmag.cd** complements the magazine and APC's Web site. When you read about a program in the magazine, such as a piece of software from a Shareware column, you need only insert **apcmag.cd**, browse it with your favourite WWW browser, and download the file directly from the CD. Articles which include related items on the CD are identified by the ● symbol at the top of the page. Each piece of software includes instructions on whether you will need to unzip the file before installing it; most also include Readme files.



Using the CDs

Everything you need to use the CDs has been created in HTML. You don't need any special software to access the discs, other than a standard browser, and they will work on most common platforms.

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While we've taken every care to ensure that the software provided is useful and that it works, we cannot accept responsibility or liability for any of the products included.

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Instructions on 'How to Enter' form part of the Conditions of Entry of all competitions in APC December. Entry is free and open to all residents of Australia other than employees of ACP Publishing Pty Ltd (ACN 053 273 546), suppliers of competition prizes, their families and associated agencies.

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Due to the volume of queries we receive, we are unable to help with technical questions over the phone. However, please post, email or fax us your technology experiences, questions, tips and hints.

How to run the CDs

Windows 95 and NT users

These CDs use an AutoRun feature for Windows 95 and NT systems. Just insert one of the discs and your browser will automatically load with the front page.

Note: First-time users will be prompted by a browser set-up program (SETUP32.EXE) which will allow you to install a browser or update your current browser. This program is only loaded once, and subsequent use of the CDs will automatically start your installed browser.

Win 3.x, OS/2, Mac, Linux

Simply launch your favourite browser and load the file DEFAULT.HTM in the root directory of the CD.

If you don't have a browser, run the file INSTALL.BAT in the root directory of the CD.

The CDs have been tested using Netscape Navigator 3.0 and 4.0, and MS Internet Explorer 3.0.

Editorial submissions

We welcome readers' letters, ideas for articles or reviews, information on new products and companies, and any insight they can give into the PC industry or the use of technology.

Article ideas

Please let us know if you have an idea for an article or review you'd like to write, or that you'd like to see us cover in APC. We appreciate submissions, but can't guarantee a reply. Please send (preferably by email) a brief résumé with an outline of your experience and interests, and a sample of your writing with an outline of the article you have in mind.

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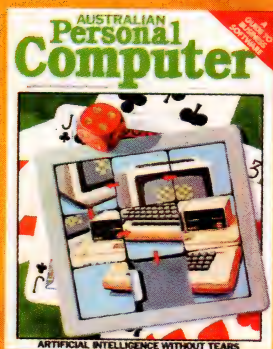
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Helping hands for learning and
using Microsoft Office 97.

Office orientation

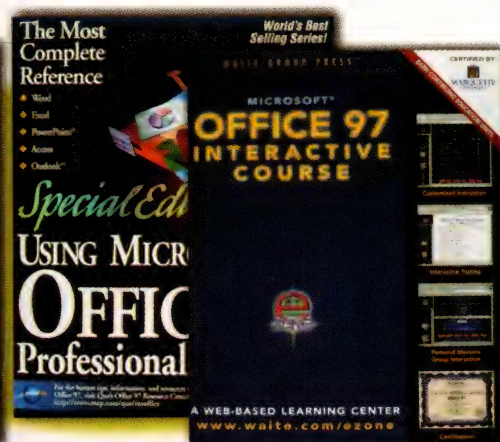
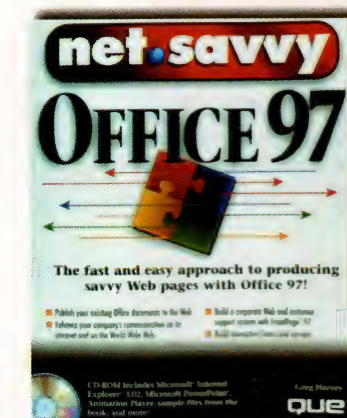
NavSavvy Office 97

The full Web capabilities of Microsoft Office are not widely known. After all, how Internet-friendly can a spreadsheet or presentation program be? *NavSavvy Office 97* will delight users of Office 97 who are also dabbling with Internet or intranet publishing. Written in an approachable, plain English style, this book begins with a quick introduction to the hidden face of Web pages — such as tags and hyperlinks — before touching on how each Office program makes use of the Internet, or in some cases makes use of Internet-inspired tricks (such as hyperlinking to other Office documents).

Unfortunately, author Greg Harvey stretches the definition of Office 97 to include Front Page 97. While Front Page is a member of the Office family, it is not part of the Office 97 bundle. You may wonder why anyone would bother using Office for Web publishing when Front Page is available. The answer is that with most corporate documentation the content creation phase is carried out in Office. Rather than recreate everything in HTML, these documents are converted to or exposed as HTML, with Front Page relegated to the role of authoring the home page, feedback forms, active pages and, of course, site management.

The book illustrates how to build the foundations of a corporate Web page with Front Page and then incorporate Office documents into the site. In the case of Word 97, this is document authoring and conversion; for Access, outputting databases to static and dynamic (ActiveX Server) Web pages; and in Excel, an introduction to using HTML's table tag extensions and the Excel Internet Assistant.

Harvey also shows how a company Web page can become a two-way experience, importing responses from an online feedback form created with Front Page 97 into an Excel worksheet or Access database. But



some judicious sidestepping is done along the way. For example, anyone who has grappled with creating and managing HTML tables inside Word will find little help here.

The companion CD adds little value to the title, as it only contains sample files and an assortment of Microsoft's own Office viewers and add-ons.

For what it covers, *NetSavvy Office 97* is a practical hands-on effort. However, if your specific needs are even slightly different from the book's lessons you may be better served by a 1,000-page masterwork that exposes the full Internet power of each Office application.

Samantha Amjadali

■ Author	Greg Harvey
■ Publisher	Que
■ Distributor	McGills Bookstore
■ Phone	(03) 9602 5566
■ Price	\$49.95
■ ISBN	0-7897-1095-1
■ Rating	★★★★☆

Office 97 Interactive Course

Despite being almost 400 pages long, *Office 97 Interactive Course* is so well structured and clearly written that it could be enjoyed simply as a good and informative read. How-

ever, unless you are able to retain the hundreds of tips, warnings, keystrokes and instructions within, it is probably best used as a reference text.

The author claims it is suitable for both beginning and advanced Office 97 users — a claim I initially felt was heavily sales-motivated, but in fact, I'm inclined to agree. You would have to be extremely well versed in all of the Office 97 programs not to find value in this book. For new users, *Office 97 Interactive Course* includes both the background and descriptions that you need. It provides step-by-step tasks to work through, and hundreds of figures to illustrate the ideas. All programs in Office 97 are covered — Word, Excel, PowerPoint, Access and Outlook. There

Guide to ratings

★	Stinks like a dead reindeer
★★	As exciting as the Queen's Christmas message
★★★	The smell of freshly-picked pine cones
★★★★	A steaming-hot Christmas pud
★★★★★	Santa-rific!

are also some useful chapters on the synergistic power of Office 97 products and its drawing tools.

Experienced Office 97 users can test their knowledge by doing the quizzes at the end of each chapter, or they can work through the advanced chapters included for each program. They will also appreciate the inclusion of sidebars that explain how a specific Office 97 feature improves upon or replaces a previous Office feature.

The only question left is whether it's worth \$90. It seems a lot to pay for a soft-cover book, but considering the time savings it would provide, it may be a worthwhile investment.
Deborah Vaughan

■ Author	Greg Perry
■ Publisher	Waite Group Press
■ Distributor	Prentice Hall Australia
■ Phone	(02) 9454 2200
■ Price	\$89.95
■ ISBN	1-57169-093-X
■ Rating	★★★

Using Microsoft Office 97, Special Edition

You know you're in for a serious read when a book has a chapter-length index, but bookstore browsers perusing *Using Microsoft Office 97* would already have figured that out from its 2kg-plus weight.

This book is generally well produced. The chapters form a fairly consistent whole despite being written by 11 authors, but the placement of some material is questionable. For example, Word's styles are covered in Chapter 10, 'Working with Large Documents', but are equally applicable to creating a one-page memo. *Using Microsoft Office 97* provides extensive but not encyclopedic coverage. It serves as a companion to the publisher's books on the individual applications.

Using Microsoft Office 97 shows how the components of Office 97 work together, such as turning a Word outline into a PowerPoint presentation. It even delves into the use of VBA (Visual Basic for Applications)

to create custom routines linking multiple applications, but here the discussion suffers from excessive abstraction. I would rather the succession of unrelated code fragments were ditched in favour of one or two worked examples — as used in some other chapters — illustrating the use of VBA to accomplish real-world tasks. I would especially recommend this book to those familiar with a single and probably older Microsoft application but who have been recently catapulted into the world of Office 97. It would be unreasonable to expect sufficient handholding for the complete newcomer or enough detail for power users.

Stephen Withers

■ Authors	Rick Winter, Patty Winter et al
■ Publisher	Que
■ Distributor	McGills Bookstore
■ Phone	(03) 9602 5566
■ Price	\$89.95
■ ISBN	0-7897-0696-5
■ Rating	★★★★

In short

Big Basics Book of Office 97

This easy-to-follow book provides users of Office 97 with an overview of the functionality offered through the Office shell, and step-by-step instructions for using its features.

■ Authors	Jennifer Fulton, Joe Kraynak and Sherry Kinkoph
■ Publisher	Prentice Hall
■ Distributor	Prentice Hall Australia
■ Phone	(02) 9454 2200
■ Price	\$39.95
■ ISBN	0-789-71221-0

Microsoft Office Small Business Edition

This book offers integrated support to the six applications in Office 97. There is also a set of Internet tools to help small businesses organise, promote and grow their companies.

■ Authors	Loe Lowery and Sherry Kinkoph
■ Publisher	Prentice Hall
■ Distributor	Prentice Hall Australia
■ Phone	(02) 9454 2200
■ Price	\$49.95
■ ISBN	1-789-71352-7

MS Office 97 Professional Quick Reference

Task oriented and presented in a logical sequence, this book delivers beyond beginners' references to get the problem-solving job done for casual to advanced users.

■ Author	Robert Mullen
■ Publisher	Prentice Hall
■ Distributor	Prentice Hall Australia
■ Phone	(02) 9454 2200
■ Price	\$39.95
■ ISBN:	0-789-71061-7

Microsoft Office 97 Small Business Edition Starts Here

This is an interactive training program that will help you quickly and easily master the Office 97 small business applications including Excel, Word, Outlook desktop information manager, Publisher and Financial Manager. It includes an interactive CD with video lesson introductions.

■ Publisher	Microsoft Press
■ Distributor	McGills Bookstore
■ Phone	(03) 9602 5566
■ Price	\$59.95
■ ISBN:	1-57231-607-1

Office 97: No Experience Required

This title covers all Office 97 components, from Word and Excel, to creating presentations in PowerPoint, building databases with Access, managing information with Outlook and creating and maintaining a Web site with Front Page.

■ Authors	Gini Courter and Annette Marquis
■ Publisher	Sybox
■ Distributor	McGills Bookstore
■ Phone	(03) 9602 5566
■ Price	\$79.95
■ ISBN	0-7821-2121-7

Windows Sources MS Office 97 Win Superguide

This book provides the necessary tutorial for each application, and explains how to harness the power available when the applications freely share information.

■ Author	Bruce Hallberg
■ Publisher	Prentice Hall
■ Distributor	Prentice Hall Australia
■ Phone	(02) 9454 2200
■ Price	\$99.95
■ ISBN	1-56276-503-5

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Perspective: Human endeavour

Are We Unique?

There is no escaping the reality that computers have become an integral part of our lives. The rate of technological advancement during the last half of this century is astounding. Computers more sophisticated than the one in Apollo 13 now sit under the bonnet of modern motor cars. Irrespective of what we do throughout any given day, we will be influenced or affected by computers. What is the next step? Are we approaching a point where we can replicate the human brain? And if so, should we?

Are We Unique? explores the question of technological advancement. The motivation for Trefil's latest book came after an encounter with a group of university students who had programmed a computer to play basic games. The computer could determine what the players were thinking, and by completion could analyse the patterns of thought behind each move. The author recalls that as he left the room he felt amazed by the achievement, but at the same time concerned by the possible implications. Perhaps one day computers could become the controlling life form on Earth, with humans reduced to a lower form of primate.

The first few chapters of this book focus on defining intelligence. The author's point is that you need to establish the parameters around which to base the definition of intelligence. All animals exhibit some type of discernment. Their ability to sense danger and avoid it, communicate, and see themselves through the eyes of another are all demonstrable forms of intelligence. By exploring these different aspects, the author hopes to establish a basis for determining why humans see themselves as the most intellectual form of life.

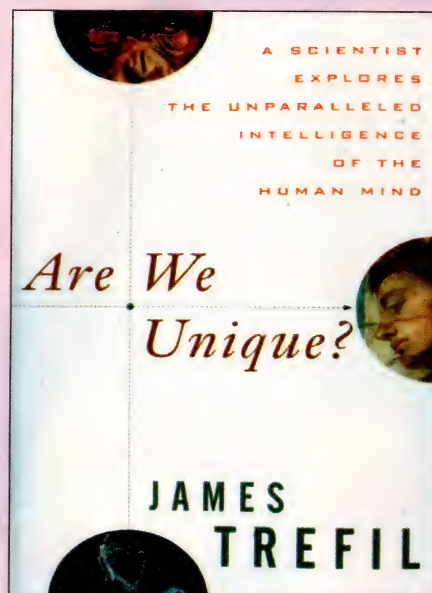
The next stage of the book explores the evolution of computers. Taking an approach similar to the earlier chapters, Trefil details the development and workings of computers. He looks at how they store data, analyse information, and produce the results we want from them. Like his earlier analysis of animals his objective is to establish boundaries. He makes some interesting conclusions at this point, specifically about the manner in which computers achieve their objectives. These are in essence quite different from the way

in which a human brain achieves the same outcome.

Trefil raises a thought-provoking question with the title of this book. As we continue to pursue a path towards faster, more powerful computers, are we also racing towards a point of evolutionary change in the dominant species? Perhaps it is all science fiction, and those intangible qualities that make us uniquely human will always remain constant, regardless of technology.

Michael Taylor

■ Author	James Trefil
■ Publisher	John Wiley and Sons
■ Distributor	Jacaranda Wiley
■ Price:	\$34.95
■ Phone	(02) 9805 1100
■ ISBN	0-471-15536-5
■ Rating	★★★★



Architects of the Web: 1,000 Days that Built the Future of Business

It seems strange that the World Wide Web should already be the subject of a history book. However, Robert Reid's account of the phenomenal commercial and technical growth of the Web in only the last 1,000 days justifies the subject matter.

Architects of the Web: 1,000 Days that Built the Future of Business details the transformation of the once 'academic and research community only' Internet, through

its extraordinary commercialisation into what is now known as the World Wide Web. The Web has never been the same since an otherwise uneventful day in 1993 when Marc Andreessen, then an undergraduate of the University of Illinois, posted the first version of X Mosaic onto the Internet. Shortly afterwards, Andreessen founded Netscape, the fastest growing software company in history.

Around the same time Kim Polese and her colleagues at Sun were commencing work on a then untitled development language. At the time they would have had little idea of the effect that Java would have on the global proliferation of the Web. Elsewhere in a trailer at Stanford University, Jerry Yang and David Filo were unknowingly securing their place in Web history by ensuring that surfing the Net is indeed way cool. Each of these seemingly unconnected events form part of an incredible 1,000 days in the communication and information revolution.

The book profiles eight of the Web's most significant architects: Marc Andreessen, Netscape; Rob Glaser, Progressive Networks; Kim Polese, Java; Mark Pesce, VRML; Ariel Poler, I/PRO; Jerry Yang, Yahoo; Andrew Anker, HotWired; and Hasley Minor, CNET.

Reid's easy-to-read yet informative style reflects genuine familiarity with each of the subjects profiled, as well as an obvious understanding of the attraction of the Web. By avoiding the temptation to detail the technicalities of the many Web products and add-ons that are the true success stories, he ensures that each profile is as interesting as the last. The companies and products detailed throughout the book are some of the world's most successful and fastest growing in history. From Netscape to Java, VRML to Real Audio, all the success stories make entertaining, motivating reading. The blending of technical, commercial and personal information about each of the subjects profiled ensures that the book will appeal to a wide audience.

Mario Tutone

■ Author	Robert Reid
■ Publisher	John Wiley & Sons
■ Distributor	Jacaranda Wiley
■ Phone	(02) 9805 1100
■ Price	\$39.95
■ ISBN	0-471-17187-5
■ Rating	★★★★

Cool tippling

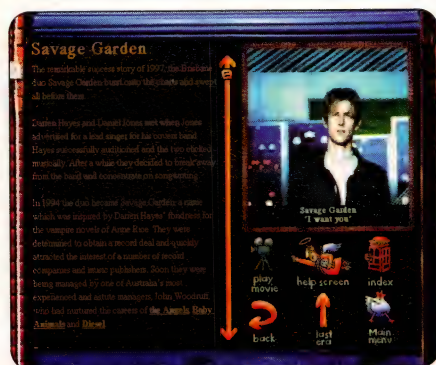
Real Wild Child

Real Wild Child is a multimedia presentation of Australian rock music from the 1950s to 1990s, based on an exhibition from Sydney's Powerhouse Museum and backed up by archival material from the ABC. The information, videos, films and audio clips are presented in seven great eras, featuring performers from Johnny O'Keefe to Savage Garden, accessed through seven different buildings along a street (such as a milk bar, representing the '50s).

Navigation is extremely easy. All information can also be reached from the main index, where you can view a full alphabetic listing or limit the display to either eras or artists. Response time is fast, but it is the presentation that really scores highly. Terrific artwork by Reg (Mambo) Mombassa in the opening and closing credits and the main street scene sets the fun tone of the production.

Each era's setting is carefully constructed; montages of photos, record covers, posters and fashions visually link you to each time period. This, coupled with the tremendous depth of information provided as you roam around each room, ensures hours of entertainment.

A high-quality voice-over introduction of pertinent social and political facts



is given for each era. You then enter the building to be confronted with a plethora of choices to investigate. All significant Australian artists have their own data page, many of which have audio or video clips, and some of which are presented as

moving collages for variety. Excellent text links are provided, and fun games, such as shoot the Bee Gees, dress the dolly, and pick an artist by poker machine, provide entertainment along the way. A humorous quiz game is also available to test your knowledge. Clicking on political heads helps to set the scene of the time, while clicking on milk bottles gives an indication of how much things cost.

The only drawback I could find is that parents may need to provide censorship or guidance for the youngest users due to the material on sex and drugs, and some of the irreverent content supplied by scriptwriter and former Doug Anthony Allstar Richard Fidler.

This very Australian project has superb sound and wonderful presentation, is authoritatively written and easy to use. Any remaining doubts that Australia can produce world-class multimedia have been blown away. Real Wild Child is all style, and doesn't skimp on substance.

Catherine Howard

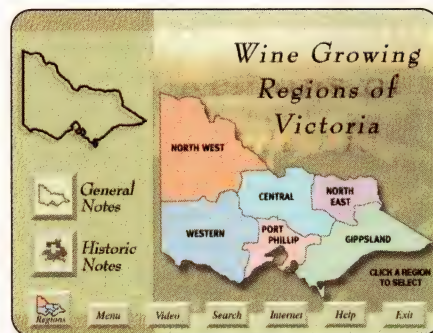
■ Distributor	Roadshow Interactive
■ Phone	(02) 9552 8700
■ Price	\$49.95
■ Requires	486 DX2/66, Windows 95 or NT 4.0, 8M RAM (16M preferred), and soundcard (stereo 16-bit recommended); or 68040 (PowerPC preferred), Mac OS 7.5, 8M free RAM; 2x or faster CD-ROM, 640 by 480 display (256 colours or better)
■ Rating	★★★★★

Wines and Vineyards of Victoria

Having snatched this CD from under the very nose of our usual Interactive reviewer, I was very much looking forward to examining Wines and Vineyards of Victoria. It arrived packaged in a smart pine packing crate, a cross between an old port transporting crate and an old-fashioned pencil case with a sliding top.

Such attention to detail and authenticity, I thought, boded well. The author's credentials were also promising. Nick Chlebnikowski is a well-known Victorian

Wine, penguins and song. What more could you want from life?



wine merchant, and in a position to be on very familiar terms with both the wine-makers and their wines.

Loading the CD was a breeze, and some introductory music led me to expect a video-driven narrative in the style of the Microsoft Wine Guide, entertainingly narrated by noted wine writer Oz Clarke.

Remembering how much trouble I had getting the Microsoft Wine Guide to run its videos, I was prepared to be patient on this occasion as well. But the process is briefly outlined in the sleeve of the software, which was enough to point me in the right direction.

To really get the best from this guide, you would need to take your multimedia notebook on tour with you, or else print out lots and lots of pages before you leave home. My overall impression is it should be in a handbook form — something to carry around and refer to. It is not comfortable in the medium in which it finds itself.

To be blunt, the CD is something of a disappointment in the spectrum of what multimedia has to offer. While there's heaps of useful information to be gleaned from Wines and Vineyards of Victoria, it lacks colour and movement.

That said, there are also heaps of irritating inconsistencies. Chlebnikowski could have benefited from the services of a sharp-eyed sub-editor before he went to the trouble of pressing and packaging his guide. In the general information section about various wineries, for example, he refers to Nicholson River winemaker Ken Eckersley and then subsequently 'Eckersley', while he's apparently on first name terms with Bass Phillips' winemaker Phillip Jones,

Interactive news

● Well over 90% of home computers now come with a CD-ROM drive, and despite lots of hoopla about DVD, it seems the medium has yet to take root. Creative (drives), Hitachi (drives), Roadshow (titles) and Philips (players) have all made tentative moves into the DVD arena, but the momentum is still very far behind what was promised a year ago. Add the moves by NEC and Sony to develop yet another type of magneto-optical disk, and confusion still reigns. Reverberations of the Beta versus VHS battle still ring loudly enough to make buyers wary, it seems.

● If the medium is still uncertain, the delivery isn't. Voice recognition programs just get better and better. IBM, Kurzweil, Dragon and more are all shipping programs which are both hardware independent and actually usable. The Sound Blaster standard has allowed makers to concentrate on compact, fast and quite effective voice programs for both controlling and dictating to PCs. Admittedly, a lot of the effectiveness depends on the quality of the microphone and the consistency of the user's enunciation — but hey, they mostly work.

● While sound may have arrived, vision is the big sleeper. Konica, Olympus, Nikon, Sony, Kodak, Epson and Panasonic are all shipping new digital cameras, and the good news is

they are becoming less PC dependent. Most will export their stored images to TV, several can print directly to photorealistic output devices, and the battery life on all of them is starting to make them usable away from the computer umbilical. Also expected is an extension of capability into digital imaging in its widest sense. The blurring of categories between still and video, digital and analog (TV) images will increase from here on. Just one gadget will take snaps and video, record sounds, take notes and even be used as a videoconferencing terminal. Things are moving fast, now that all the major photographic companies are getting in on the act.

● Last on the interactive list is, of course, the Internet. Corel is plunging ahead with its customised solution for the Net-based videoconferencing market, based on its own brand of hardware on Java-enabled NCs. Although not doing too well in the CD-ROM world (where it recently shed all its consumer titles), Corel is pinning a lot of hope on the new venture. Could it be that it envisions the marriage of Internet hardware capability with a software distribution need? This would be the ideal way to cut costs in the application war with Microsoft. We shall wait and see.

Jeremy Torr

referring to him as 'Phillip'. Ewan Jones from Dalwhinnie, on the other hand, is kept at arm's length and referred to by both names throughout. Errors of tense, lack of apostrophes and plain old typos contribute to the impression that it was all done in a hurry, which is a real shame.

On the upside, the CD offers a comprehensive, albeit 2D touring guide through Victoria; users are instructed on which types of wine to expect from each region, where to stay, and what food will go well with the wines selected. It is extremely easy to click through, go back to any place you've been before, and cross-reference wineries and nearby places to stay. An Internet interface is also provided, so should the urge to acquire some of the wine you are reading about become too strong to resist, you can immediately link to the Nicks Wine Merchants (sic) page and order it.

On the downside, the effort to cram so much information in has meant that the font size chosen is too small for comfort.

None of these criticisms, however, couldn't be easily solved with a little more time spent on design and quality control.

It's a good idea, and the basic content is useful and interesting. I look forward to Version 2.

Helen Dancer

■ Publisher	Rainbow Iris
■ Distributor	Dataworks
■ Phone	(03) 9764 8344
■ Price	\$49.95
■ Requires	486 multimedia PC, Windows 3.1 or 95, 8M RAM (16M recommended) Sound Blaster-compatible card, 2x CD-ROM drive, video capable of 640 by 420 by 256 colours. Modem and Internet connection required for Internet link.
■ Rating	★★★

Life in the Freezer

Every now and again a published work surfaces that is so different, yet immediately resonant with everybody, that it succeeds beyond all expectation: Books such as the *Bridges of Madison County*, films such as Baz Luhrmann's *Romeo and Juliet*, music such as Pachelbel's Canon. Without being too pompous about the whole

thing, this CD-ROM from David Attenborough and the BBC deserves to be considered in the same category. It is truly inspiring.

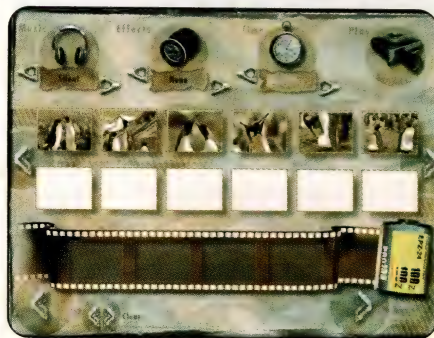
From the word go, Attenborough's enthusiasm and knowledge shine through to create probably the most powerful treatise yet on the ice-bound continent of Antarctica. After seeing this disc I was seized with an urgent desire to go there. The images are absolutely superb; Attenborough's narration is sympathetic yet accurate and informative, and the music is so BBC-brilliant that the whole thing will keep you transfixed for hours.

This CD-ROM does exactly what Attenborough says it attempts to do — reverse tourism. Instead of taking the tourist to the destination, it brings Antarctica to the viewer. You can simply browse around the map, dropping into everywhere from the Kerguelen Islands to the South Orkneys, or you can ask David to take you on a guided tour of the place, the inhabitants and their habits. Or you can compile your own slide show from more than 2,000 photos, or put together your own project using any of the material on the disc, then print it out for school or even for a coffee table book — the quality is that good.

The program also offers interactivity with its Quests. These include a race to the pole with Amundsen, following the food chain from plankton to killer whale, and testing your general knowledge. Quests are fulfilled by collecting images and information in a virtual knapsack, then associating them with the correct locations or wildlife. But just sitting drinking in the quality and atmosphere will probably be enough for most users. Get it.

Jeremy Torr

■ Publisher	BBC Multimedia
■ Distributor	Roadshow Interactive
■ Phone	(02) 9552 8700
■ Price	\$65
■ Requires	486/66, Windows 3.1 or 95, 8M RAM, 2x CD-ROM drive, 16-bit SVGA
■ Rating	★★★★★



*Psycho clowns, two-headed panthers and Klingons.
Whatever your taste, GameZone has it covered.*

Six of the best

Riven

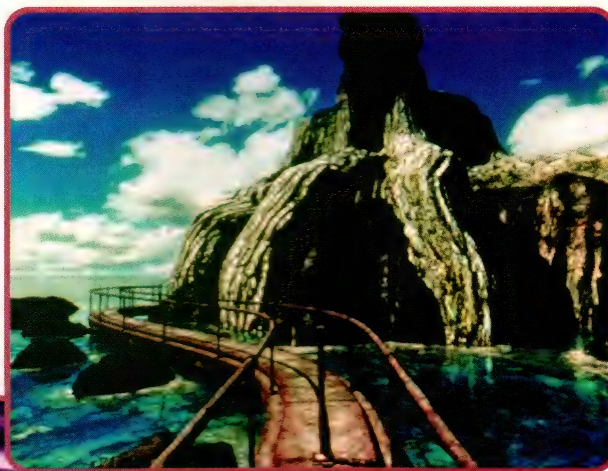
There's no disputing that Brøderbund's *Myst* is a simply great game, and its 3.5 million or so fans will no doubt flock to get *Riven*, the sequel. While *Riven* follows on where *Myst* left off, new players can jump right in without the prior knowledge so often required by sequels.

The story goes that Atrus — the writer who created worlds through his magic books while living on *Myst* Island — is trying to locate his wife Catherine, who is imprisoned in the world of *Riven*. Atrus' father, Gehn, is also trapped there, but there's no love lost between the two men. The corrupt Gehn wants to restore the D'ni Civilisation at the risk of sacrificing others, so beware of him and his creatures.

Atrus welcomes you in the opening video with, "Thank God you've returned, I need your help!", then presents you with a Linking Book to help with the quest for Catherine. Refer to this often, as it has plenty of clues and in full-screen view its pages turn most realistically.

Riven is a five-CD epic featuring around 70 full-motion videos of live actors. Its many complex and interesting puzzles add much to the game's charm and appeal. I was also impressed with the beautiful ambient sounds and music, and the high quality of the full-screen graphics and general scenery. In the opening scene, for instance, you climb a hillside's stone steps, then cross a suspension bridge to reach a door set in the opposite hill. Lifelike sights and sounds make you feel like you're part of the action.

I played *Riven* on a Pentium 166 with 64M of RAM and had no trouble at all. However, I can imagine that users with slower computers might want to set their own transitions between screens from the menu that offers 'none to



welcome option that I've wished for in other games is *Riven*'s 'Zip Mode', which enables quick transportation to places you've been already. It saves much messing about, but I advise using it judiciously or you might miss something.

Riven is a very playable yet sophisticated game. It satisfies the soul and the senses, and keeps you coming back for more.

Eric Holroyd

■ Distributor	Dataflow
■ Phone	(02) 9417 9700
■ Online	http://www.redorb.com , http://www.cyan.com
■ Price	\$99.95
■ Requires	Pentium 100, Windows 95, 75M disk space, 4x CD-ROM drive, high colour GFX, DirectX-compatible video cards and soundcards
■ Classification	N/A at press time
■ Rating	★★★★☆

Hexen II

Doom, *Heretic*, *Quake*, *Hexen* — the big names in fast action, shoot-everything-in-sight arcade adventuring — now have a worthy successor in the long-awaited *Hexen II*. Two versions are included on the CD: one for standard graphics cards, and a GL version for owners of 3D graphics accelerators based on the 3Dfx Voodoo chipset (such as the Canopus Pure 3D distributed by Creative Pacific). Both versions are much brighter and more elaborate than the dark and gloomy *Quake*.

Fans of the genre will simply love it, as it has



much more of everything, including more colour, RPG elements and pure adventure puzzle solving. The enhanced 3D Quake engine, claimed to be the world's best, has created very smooth graphics. There are some fantastic graphic effects as backdrops to the main action; the shafts of light that stream down from overhead in some of the cathedral scenes are really something. The animation of Hexen II's many creatures is frighteningly realistic. This is partly due to the increased frame rate of 20 frames per second, but the real secret is that each creature has a wireframe skeleton, providing better motion control and making them fully textured from every angle.

Other games in this genre have an underground cave feel, but Hexen II adds an exciting new element with several exterior scenes in some levels. The use of another new programming tool, 'rotational brushes', has created some terrific animations like dropping trapdoors, spinning windmills, and surprisingly exciting rotating gears. Those spinning windmills, by the way, can be used to crush things...

Hexen II has a developed plot, and

and the Seal of the Ovinomancer which turns your opponent into a sheep. The Boots of Speed and the Invisibility Sphere are pretty neat too.

Eric Holroyd

■ Distributor	Activision
■ Phone	(02) 9869 0955
■ Online	http://www.activision.com
■ Price	\$89.95
■ Requires	Pentium 120, Windows 95 or NT, 24M RAM, Sound Blaster compatible card, 2x CD-ROM drive, 120M disk space, 3Dfx card for GL version
■ Classification	MA 15+
■ Rating	★★★★☆

Dark Reign

Activision has a huge line-up of impressive games, and one of its biggest current titles is Dark Reign, by Brisbane-based Auran. This joins a growing list of real-time strategy (RTS) games, following in the footsteps of popular games like Warcraft and Red Alert. However, Dark Reign isn't just another Red Alert clone — it revolutionises the genre.

The playable sides in Dark Reign are the Freedom Guard and the Imperium (who are engaging in a huge intergalactic war), and, in multiplayer mode, the Tograns, who are peaceful scientists trying to unlock the secrets of the universe.

One of the first things you notice about Dark Reign is the stunning graphics, which play a key role throughout. Different surfaces affect

how efficiently a particular unit can move and, unlike previous games, units in Dark Reign have 'line of sight'. This means that a unit in a gorge cannot see a unit standing above, and a unit standing on top of a mountain can see more terrain than a unit below it. Another innovation in Dark Reign is the ability to give orders to troops. You can make units scouts or guards, order them to harass the enemy, and even adjust their level of independence.

Although Dark Reign contains many new features, it's the subtle tweaks that

make playing so compelling. These enhancements mean you can queue the building of units, have more than one unit building at once, assign a unit to more than one group, set complicated 'way-points' for your units to follow, and designate where units deploy once they are built. There are also great editors for map-making, unit-building and artificial intelligence.

Dark Reign has multiplayer capabilities, and allows you to share resources. It's very easy to play over the Internet — just start Dark Reign while connected and it finds all available servers, telling you the ping times for each one. You can also download extra teams, structures, units and terrains from <http://www.auran.com>.

The only downside to Dark Reign is the sea units: there are hovercrafts, but it would have been nice to see a greater variety.

Dark Reign is undoubtedly the best RTS game to date. I was never really a fan of this genre, but this one has me hooked. If you like games like Red Alert, then Dark Reign is a must-have; even if you aren't a huge RTS fan, it's definitely worth a look.

Alan Crawford

■ Distributor	Roadshow Interactive
■ Phone	(02) 9552 8700
■ Online	http://www.auran.com , http://www.activision.com
■ Price	\$89.95
■ Requires	Pentium 90, Windows 95, 16M RAM
■ Classification	G(8+)
■ Rating	★★★★☆

Lands of Lore: Guardians of Destiny

Sequel to the excellent Lands of Lore: Throne of Chaos, and stablemate to Eye of the Beholder, this episode is sure to become known as 'Lands of Lore II' to the myriad fans of Westwood Studios' productions.

Whatever it's called, it's a simply brilliant epic with a unique plot centred around a character who's both blessed and cursed with a kind of Dr Jekyll and Mr Hyde syndrome. This bizarre transformation is entirely unwelcome, and part of your quest as Luther is to rid him of the magical powers that cause it. Fail, and you risk it taking over completely and destroying him.

Guardians of Destiny is a huge game offering more than 100 hours of play in 20 challenging locations. It comes on four CDs which hold around four hours of full-screen, full-motion video. Scenes are seamlessly interspersed with the action. A good example is Luther's death scene after



you're the hero in 35 complex levels (five of which are deathmatches). Your job is to defeat Eidolon, the evil Serpent Rider, using might and magic and your choice of four characters: Necromancer, Paladin, Crusader or Assassin — each with unique weapons and specific characteristics. Game control is by keyboard, joystick or mouse; Internet and network play is also supported.

Standout effects include the meteor shower of bouncing boulders that shatter as they hit the ground. Also watch for 'Magic Mouths' that scream warnings or give clues,

Gamespy

ActivAuran?

The partnership that produced the groundbreaking *Dark Reign*, between Australian developers Auran and a resurgent Activision, has gone one step further. Activision was so chuffed with the team at Auran that it decided to import the local developers — lock, stock, and barrel to the good ol' US of A, offering it *substantial* remuneration packages. The real question, though, is whether Activision is turning into the Microsoft of the games industry, buying up all the little minnows with good ideas and absorbing them into its company? Only time will tell, but in the meantime, if you're a games development company with a taste for travel, it might be an idea to throw your ideas Activision's way...

Ironical games? Wassat then?

Hot on the heels of *PYST* (a lovely take-off of *Myst*) and *Star Warped*, Parrot Interactive has just released a parody of the 'X-Files' (and if ever there was a pop-culture show that took itself way too seriously...). It features the talents of Scudder and Mully, with the player taking the role of a trainee agent under the two ultra-paranoid ex-FBI agents. It's gratifying to see a company that isn't afraid to explore ways of breaking game

conventions — in ways other than throwing in lashings of gratuitous and realistic violence for the sake of notoriety, which seems to be the trend lately.

3Dfx buy-back scheme

So you shelled out some of the hard-earned for a precious 3D accelerator card? Congratulations are in order... unless you bought a Voodoo Rush-based card. In spite of popular opinion, the 3Dfx Voodoo Rush chip is different to the standalone 3Dfx, and with games such as *Quake* there is often a marked difference in the frame rate. The people down at 3Dfx offered to exchange the Voodoo Rush daughter-board with a standalone 3D card for free. While many were quick to jump on the 'we love 3Dfx customer service' bandwagon, there are a couple of catches. Firstly, it's now too late to exchange your card — the offer was only good for a month; and 3Dfx didn't think that publicising the exchange scheme would be a good move (for them at least). So unless you had your finger on the pulse, you've missed out. If you're affected by this, feel free to contact 3Dfx (support@3dfx.com) to let them know how you feel. Just don't tell 'em I sent you!

Gareth Jones

he gets through Draracle's Caves in the game's opening minutes. Three lurking guards dispatch him very smartly, so off you go to start over.

The game has a friendly interface that lets you play with either keys or mouse, and you can switch mouse control on or off with a right-click. I found this was a benefit as there were some areas that were more comfortable to mouse around.

A small display at the bottom right of the screen has the control icons plus a picture of Luther's face. When he's about to transform you hear a bloodcurdling groan ('Oh no-o-ol') and he morphs to one of his other forms. It's great to see the reaction from enemies when he's the beast — they usually turn and run instead of attacking. The scenery and graphics are quite beautiful, and the full 360° movement immerses you fully in your surroundings. Interaction with the many characters is good, and there are plenty of friendly ones to help you along the way. There are just as many highly intelligent enemies, though, and some real horrors, like the double-headed pan-

ther with the huge teeth, and the strange but deadly Hive Warriors. Luckily, you have much magic at your command. You'll need it...

Eric Holroyd

■ Distributor	Virgin Interactive
■ Phone	(02) 9417 1322
■ Online	http://www.westwood.com
■ Price	\$89.95
■ Requires	Pentium 90, Windows 95, 16M RAM, 220M disk space, 4x CD-ROM drive
■ Classification	MA 15+
■ Rating	★★★★☆

Star Trek: Starfleet Academy

Ever wanted to know what it takes to become an officer on a Federation Starship? *Starfleet Academy* lets you follow in the footsteps of previous cadets like Captains Kirk, Chekov and Sulu by undertaking more than 25 simulated missions to prove your worth as a Starship Commander.

Starfleet Academy isn't a straight shoot-

'em-up space simulator like, say, *X-Wing* vs *TIE-Fighter*; it's a true 'Star Trek' sim involving a realistic balance of combat and strategy. The storyline revolves around your crew, and how everyone handles life at the academy. Conflict between social lives and training can be disruptive for everyone, and as Commander you must ensure that everyone is happy and performing at their full potential. You'll hold conversations with your crew members and what you say to them is very important.

The cinematic appearance of *Starfleet Academy* is very entertaining. With appearances from leading 'Star Trek' actors such as William Shatner, there is a real sense of being among a group of cadets all wanting to become *Starfleet* graduates.

When it comes to combat with the enemy it's not as simple as targeting and firing phasers. Damaged shields are promptly repaired by the crew, but your allocation of the ship's resources may save or lose the ship. A detailed knowledge of your enemies' weaknesses, gleaned from the ship's library, will give you an edge.

Mission objectives may involve crisis management, diplomacy, moral dilemmas and military conflict. Failed missions must be re-attempted until satisfactorily completed; it can become very monotonous hearing instructors repeatedly tell you that "Your score is inadequate, you'll have to repeat the mission".

An element of the game I found frustrating was the ability of the enemy ships to cloak themselves. It may be an integral part of the 'Star Trek' story, but it's disheartening to see your enemy disappear in front of your eyes, then reappear at the rear to give you an unexpected pounding. The sight of the ships cloaking themselves is, however, visually stunning. The ship doesn't merely fade to black, but becomes gradually transparent with a technique Interplay calls 'translucent texture mapping'.

Starfleet Academy, with its five CDs, will provide *Star Trek* fans with hours of entertainment. I was left wondering where the hell that Klingon Bird of Prey disappeared to.

Kieran McNamee

■ Distributor	Interplay
■ Phone	(02) 9959 1074
■ Online	http://www.interplay.com
■ Price	\$89.95
■ Requires	Pentium 133 or better, Windows 95, 16M RAM, 4x CD-ROM drive; 80MHz PowerPC or better, System 7.5 or later, 25M RAM, 2x CD-ROM drive

Games news

- Speculation abounds regarding Microsoft's production of a Windows-compatible OS for Sega's next 64/128-bit console, with ASC Games executive producer Travis Williams recently suggesting there may be a \$250 price tag. This will be of interest to gamers unable to afford a high-end PC.
- An edited version of the much-anticipated Postal will be rated MA 15+ and play mainly as a 'self-defence' game, with things like the Execute command, female voices screaming "I can't breathe", and the schoolyard massacre level being removed. At time of press, Sega Ozisoft was projecting a pre-Christmas release.
- Electronic Arts is currently shipping 10 3Dfx games supporting the Voodoo chipset, including Need for Speed, NBA Live 98 and Wing Commander. More 3Dfx titles are to follow.
- Magic Artist, Disney's Windows 95/Mac CD-ROM (\$69.95), lets kids of all ages create and print fun artwork using favourite Disney characters like Mickey, Goofy and Pluto. It has easy tools, ready-made 'magic stamps' and a musical slide-show maker. There are more details at <http://www.disney.com>.
- Activision has secured the rights to Avalon Hill's legendary Civilization strategy game series, with new episodes currently in the pipeline.

- Madeline, the beloved French character from the book and TV series, is featured on a Creative Wonders' Windows 95/Mac CD-ROM of the same name (\$29.95 from Electronic Arts). The great range of learning activities will appeal to younger children. Other recent releases include a series of Sesame Street titles (\$49.95) which introduce toddlers to the world of reading through characters such as Elmo, Big Bird and Cookie Monster. More details at <http://www.creative-wonders.com>.
 - NetStorm is another Activision real-time action strategy blockbuster featuring Internet warfare. A downloadable demo multi-mission multiplayer demo is available at <http://www.activision.com>.
 - Electronic Arts has five new Fox Interactive PC titles: Croc, a 3D platform game; The X-Files: Unrestricted Access; The Simpsons: Virtual Springfield; Anastasia: Adventures with Pooka and Bartok; and Aliens vs Predator, a hard-core 3D action game.
 - A free 3D upgrade for Metro's X-Wing vs TIE-Fighter is available for downloading at <http://www.lucasarts.com/static/xvt/xvtdirect3d.htm>. It requires a 3D accelerator (3Dfx chipset recommended). The Web site has full details.
- Eric Holroyd**

■ **Classification** G(8+)
 ■ **Rating** ★★★

Constructor

For as long as computer games have been around we've had 'build your own world from the ground up' games where you erect factories and houses for workers, develop farms to grow food, and put together a policing system to control things. Some have been simply excellent — one even let you build a whole galaxy. I came to think of the genre as 'God games'. Constructor is a God game, but there is much more to it: it has Attitude!

In addition to having many elements of other computer sim and strategy games, Constructor also has elements of the board games Monopoly and Risk.

Developed for Windows 95 and DOS4GW, Constructor is well conceived and has beautifully drawn, finely detailed graphics. The playscreen has the usual icon stuff down the right-hand side, but your actual view of the game is a sort of window on the world. This scrolls around smoothly, allowing you to see virgin paddocks, forests and landscapes where you can lay roads, build houses



and factories, and generally supervise your burgeoning world.

A quick way to make money is to build plenty of houses and rent them out. Your opponents (there can be up to three, computer or human) will probably be doing the same. If you want to get their tenants out (to put in your own), there are seven types of 'undesirables' that you can use to

harass them into leaving. If you're a nice, quiet tenant there's probably nothing worse than an all-night hippy party going on across the street. Unless, of course, it's being beaten up by mobsters, or a psycho clown chainsawing your new front door.

Factories bring in good money too, and you can use your mobsters to picket opposition factories, close them down, or even have their managers 'disappear'. You'll be dealing with the Mob on some of these capers, though,

so be prepared to pay the price.

Constructor has a huge variety of options, and your behaviour can range from good to shady. The game plays extremely well. It would be great to complete the Utopia level, where the whole world is happy.

Eric Holroyd

- **Distributor** Roadshow Interactive
- **Phone** (02) 9552 8700
- **Online** <http://www.village.com.au>
- **Price** \$89.95
- **Requires** Pentium 100, Windows 95, 16M RAM, 8x CD-ROM drive, 60M disk space, 2M GFX card
- **Classification** G(8+)
- **Rating** ★★★

It's Christmas, so what do you do? Visit Santa, buy a few gifts and stuff yourself to the point of obesity.

But once a year

Santa Claus

How many ISPs operate from the North Pole? That's a question I've never asked myself, but it seems there's at least one, because Santa has a Web site.

And it's all very cute, if a little cheesy. There's an FAQ which covers everything you've ever wanted to know about Father Christmas, but were too afraid to ask. (In case you're interested, Santa does use a Mac.)

There are numerous Christmas tales, including, apparently, all of Charles Dickens' *A Christmas Carol*. There's also a joke page, where you can post your favourite Christmas jokes. The majority of these are about as funny as a Christmas cracker joke, but are probably the sort of things kiddies find hilarious.

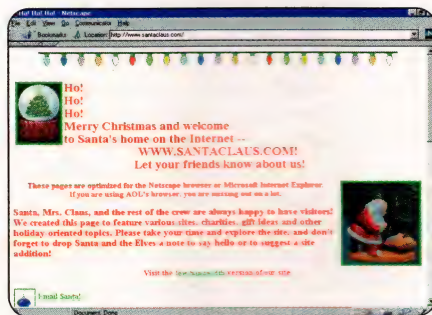
The main attraction of the site is that you can email Santa if you find writing letters a little passé. While this section of the site was not active when APC visited it, it will allow you to email Santa or send a message to your friends.

Dissing the Santa Claus site would place me squarely in the category of Ebenezer Scrooge and the kleptomaniac Grinch, and will probably seriously hamper my chances of getting an Aston Martin for Christmas. Still, I can't afford the insurance anyway. So...

The site's a bit, well, bland. It is obvious from the awards and reviews that the site has accrued that it has been around since at least 1995, and a lot has changed in Web site design and modem transfer rates since then. Having a spunky-looking Web site is no substitute for decent content, and there's nothing worse than a site that takes forever to download; but this site seriously lacks sophisticated design. A guy who can deliver presents to every child in the world in one night could surely be a master of HTML.

It has lots of information about Christmas around the world and games to play at Christmas time, but this is through links to other sites. Such a cool domain name warrants more actual content and less taking the visitor off the page.

While it's admirable that the site links to various charities in the hope of encouraging people to make donations, it also seems crassly commercial that it links to



suggested gift sites. Does Santa Claus really endorse the Arnold Palmer indoor golf game?

Finally, while Santa has obviously ensured that the content on the site is suitable for the family, it's a shame a few of the jokes on the humour page suggest a certain person doesn't really exist. This spoils the illusion of the whole site and could upset a youngster if they stumbled upon it.

But we should not be too 'bah humbug' over this. It's Christmas, the site's sweet and its audience is probably not going to notice these quibbles. Besides, I do want an Aston Martin.

Kerrie Murphy

■ Online <http://www.santaclaus.com>

■ Rating ★★☆☆

Telstra Surelink

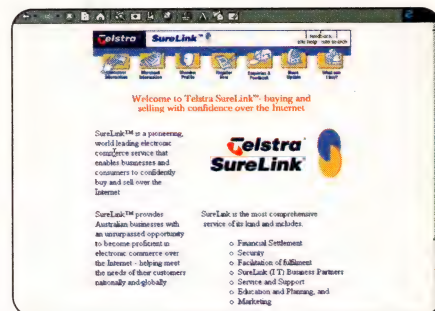
It's Christmas, the money your spinster aunts gave you in lieu of a Lowes T-shirt was a welcome relief and that newfangled Internet thing is just waiting somewhere on the other side of your brand-new computer's monitor. What a wonderful way to spend money!

But wait. Isn't it dangerous to send your credit card details over the Internet? And how do you stuff bank notes into that slot on the front of the computer? In reality, both the risk and lack thereof of buying goods over the Internet have been overstated, but convincing Joe and Joanne Average that it's OK to shop online still leaves an awful lot of potential shoppers with their wallets firmly pushed into their cyber-pockets.

Telstra, adept as ever at spotting a money-making opportunity, has staked some firm territory on the information

super-mall with SureLink, a service devised to make people feel comfortable about buying things over the Internet. Telstra also takes a very small cut — 20 cents — of every transaction made; not enough to annoy consumers or dissuade merchants, but enough to translate into a real cash cow as soon as we start buying things. Or paying bills. Or booking holidays. The basic idea seems to be that if there's a physical transaction that can be translated into a Web-purchase opportunity, you can stick it up on SureLink (after paying the appropriate merchant fees), and wait for the buyers to come.

At the moment, merchants are pretty thin on the ground with B-list chain stores like Angus & Robertson and regular mum



and dad shops providing a pretty eclectic mix. At the time of writing, none of the big mass marketers, such as Kmart, Coles, Grace Brothers or David Jones, whose presence would serve to legitimise the service, had come onboard.

Telstra's own brand equity will go some way towards rectifying this, but SureLink's long-term survival depends, more than anything, on large merchants coming aboard and turning the Internet into 'just another transactional medium'. When will Internet commerce have arrived? At the point when the fact something was purchased online is no longer noteworthy.

As a shopping experience, SureLink is efficient, easy and clean — the perfect shopping expedition: no shop assistants, change rooms or bad muzak. But shopping is more than a transaction; it's a tactile, sensuous experience that won't ever be approached by the online equivalent.

Where SureLink does win is in com-

modity purchases like CDs and books, and in bill paying, where the real experience is long on inconvenience and short on sensuality. Overall, a class effort that just might convince punters that Internet shopping is the way to go.

Josh Gliddon

■ **Online** <http://www.surelink.com.au>

■ **Rating** ★★★☆

Jenny Craig

Plum pudding, turkey, bonbons. Roast potatoes, custard and chocolates. Shortbread, ham . . . the list goes on. Christmas time for most Australians is an unfortunate combination of heavy food and a climate that necessitates beachgoing.

In many, this will produce temporary insanity, manifested by calling the Jenny Craig (JC) hotline. But before handing over your credit-card details, check out <http://www.jennycraig.com>, and see what you'll be letting yourself in for.

Subtlety is not an American trait. Confronted by an image of scales on the site's splash screen, the weak will click away. The strong will be further tested by cheesy motivational *bons mots* like "we are reaching our goal", and a site map that looks like a diagram of a fat cell. If only recoiling in horror could burn kilos . . .

The rest of the site, however, is far more tasteful, and, while not exciting, gives a good overview of the company and the program (except for costs). The current version is oriented around company financial information and press releases, which reveals some interesting information about recent controversy that has embroiled JC on several fronts.



In a recent press release, JC's CEO admitted that the controversial fen/phen diet pill led to a drop in company profits. Another press release focuses on the court ruling that means the company's advertisements must say "For many

Surfbaud: The 12 days of Christmas

Ah, Christmas. Holidays, sleeping in, decorations, and 'The 12 Days of Christmas'. To discover the meaning of this bamboozling ditty, drop by <http://www.norfolkne.com/xmas12da.htm>. Once you have the lyrics down pat, bop along to a MIDI Karaoke version at <http://www.carmelnet.org/chas/midfiles/xmasmidi.htm>.

'Twelve drummers drumming' . . . arguably the most famous drummer in history is Ringo Starr (<http://web2.airmail.net/gshultz/bio1.html>); but let's not forget our humble eardrums (<http://web.bu.edu/COHIS/help/find/bodypart/heent/ears.htm>) without which we couldn't hear them!

'Eleven pipers piping' . . . the online Mecca for bagpipers is <http://www.bagpiper.com/>.

'Ten lords a-leaping' . . . at England's infamous House of Lords (<http://www.lonelyplanet.com/dest/eur/bri2.htm>) you won't find any of the posho parliamentarians romping around in girlie tights (<http://userwww.service.emory.edu/~mgros/brooks/soundsro.html>) — well, not in public anyway.

'Nine ladies dancing' . . . I'm ashamed to admit it, but the best dancing advice I ever got was from a hyperactive eight-year-old: "Just get on the dancefloor and shake anything that moves" . . . I think the nine ladies at <http://www.ronkurtus.com/interest/waltz.htm> had something a little more demure in mind. Probably not belly dancing (<http://www.aaleena.com/gallery/>) and definitely *not* moshing (<http://kopis3.pspt.fi/~perikso/headbang.html>).

'Eight maids a-milking' . . . Next time you're in New York State, drop by the Hull Dairy Farm for a few quick lessons in the age-old art of milking a cow (<http://www.apk.net/hull/>). And what better

excuse for a gratuitous mention of my favourite software site, Tucows (<http://www.tucows.com>)?

'Seven swans a-swimming'. No swan ever swam as fast as Keiren Perkins (<http://www.ausport.gov.au/swim/zkperkin.html>). But even his high-speed swims aren't nearly as compelling as synchronised swimming (<http://www.luna.co.uk/~synchro/world.htm>). And I suppose I should mention the Swans, the Sydney Swans that is (<http://www.sydneyswans.com.au/>).

'Six geese a-laying' . . . A full-on goose who lays almost daily golden eggs is Gus, of Gusworld (<http://apcmag.com/gusworld/>).

'Five golden rings' . . . The Olympic rings aren't gold, but there are five of them, one for each of the original continents (<http://www.comstock.com/dave/olysymb.htm>) and the winners do get a chunk of gold (<http://www.acithn.uq.edu.au/simon/olympics.html>).

'Four calling birds, three French hens, two turtle doves' . . . These fluffy creatures are so versatile. How many other animals can you take pleasure listening to (<http://avoca.vicnet.net.au/~birdsau/calls.html>), watching (<http://uslink.net/~rosebudm/bluebird.html>), feeding *and* eating (<http://www.mymenus.com/rec04.html>)?

"And a partridge in a pear tree" . . . Yet another delicious birdie (<http://www.shootingsports.com/nystern/home.htm>), especially with a rich pear sauce (<http://countryliving.com/helpers/cooking/09frui1.htm>). Remember 'The Partridge Family'? TV's hippest musical siblings (<http://www.eden.com/~gregandi/pf/webring.html>) still have a die-hard following on the Web — they even have their very own highly sought after Christmas Album (<http://www.geocities.com/Hollywood/5255/xmasrev.html>).

Samantha Amjadali

dieters, weight loss is temporary". But whoever observed that the Western world spends more money on trying to lose weight than the Third World does on eating must be close to right — \$US33 billion is spent annually in the US on weight reduction products and services, JC alone made \$US11.8 million profit last year.

If you are still interested, you can read an eight-page report, 'The Leaning of America', which does include some sound advice on sensible weight loss methods. There is also an FAQ with helpful questions such as "Is Jenny Craig a real person?". You'll be surprised by the answer.

Most of the information, such as phone numbers and locations, is US-specific, even though JC has centres in several other countries. Another gripe is that Adobe Acrobat files are overused, especially for one-page documents.

Planned improvements should make the site more interactive: Real Audio narratives, online video, Shockwave demos, and a chat room. Maybe another helping isn't such a bad idea after all.

Dominique Jackson

■ **Online** <http://www.jennycraig.com/>

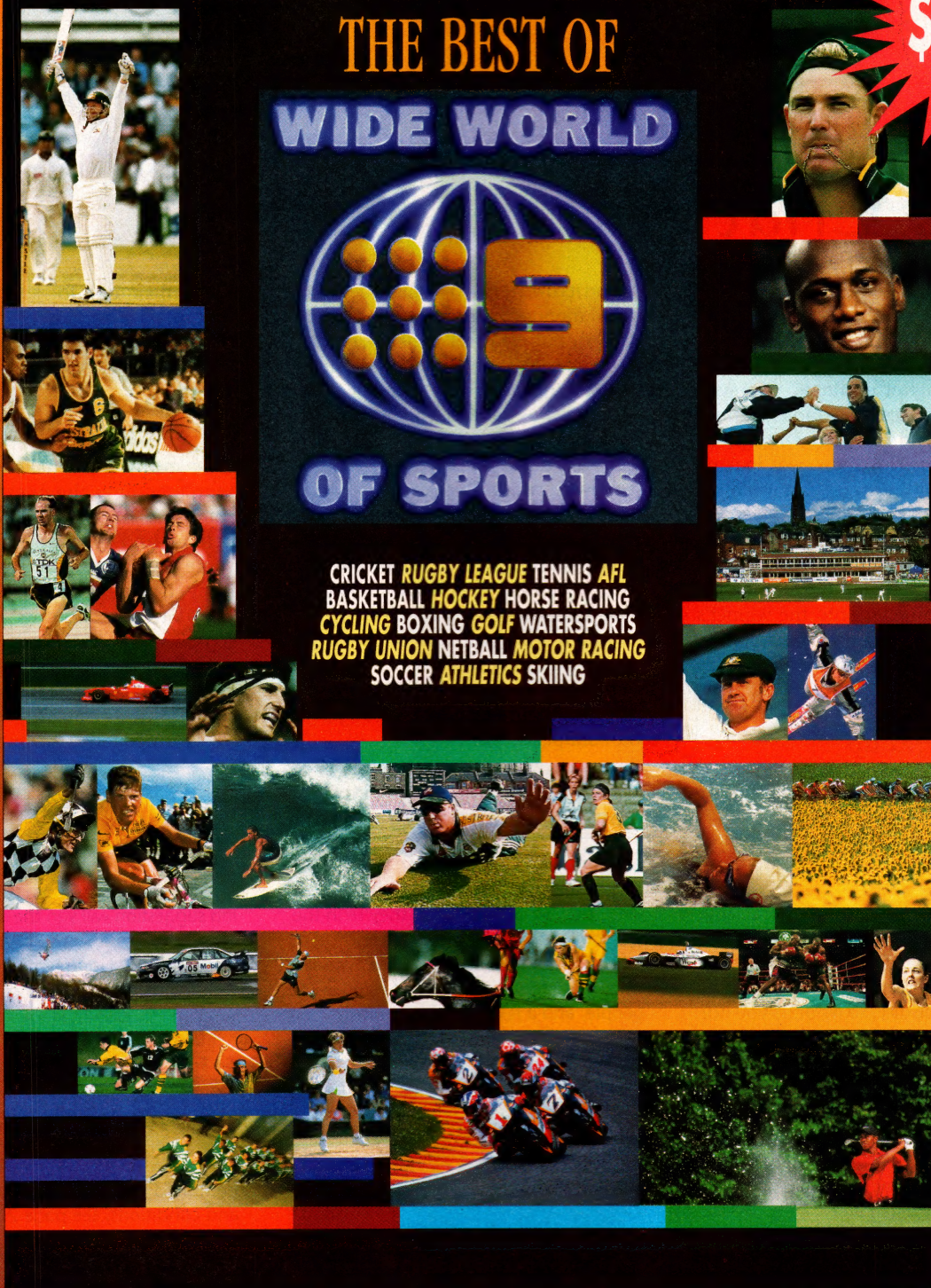
■ **Rating** ★★

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If you're happy and you know it, clap your hands. If not, let Chip Chat know — we've had a gutful too.

Chip Chat

Tears on my pillow

While Internet Explorer 4.0 has brought tears to many a user's eyes, they haven't always been tears of gratitude. However, Harvey Sanchez, Microsoft's main man for IE in Australia and the most enthusiastic person this side of Tim Shaw, was looking distinctly moist in the eye region when IE4 nabbed the top prize at APC's Best of 1997 Awards (details in next month's mag). Harvey, whose buoyant energy suggests that Jolt is still king on the MS campus, spent the rest of the evening clinging onto the winner's certificate and grinning uncontrollably. Rumours that he may be about to star in his own sitcom were unconfirmed at press time.

The boys light up

Picture it: Sicily, 1932. The Petrillo family gather together for a funeral . . . Oops, sorry, thought we were in an episode of 'The Golden Girls' there for a moment. Let's try again.

Picture it: you're a software company, you're planning to send out a demo CD of your stuff, and you realise that this will only take up a small percentage of the 640M or so available on the disc. So what do you do? If you're NDG, the developers of the 'Boy' range of network management products, you decide to give your customers some free music on the disc: in this case, three classic tracks from '80s Australian rock icons Australian Crawl.

This is, basically, a very neat idea, but we do have one question. According to NDG, most demo CDs typically have several hundred megabytes of free space. So why are we only getting *three* tracks?

You spice up my life

Speaking of musical acts on CD-ROM, it didn't escape our attention that the Spice Girls, those bouncy British birds who have proved that marketing and music really do go hand in hand, are planning to release their own PlayStation game (indeed, it may already have hit the shelves by the time you read this). It is not the first time a pop group

has had its own game (Frankie Goes To Hollywood managed that trick way, way back in 1985), but we can't remember anyone doing a console game, apart from Michael Jackson's infamous 'Moonwalker'. Mind you, there was something very satisfying about kicking people's heads in with a moonwalk/headspin combo.

Anyway, with the Spice's already-established reputation for bifferama, the title could be a hoot. We'd like to offer a few suggestions for hidden levels within the game:

- A hype contest where you (in the role of Ginger Spice) have to try to outdo Larry Ellison, who is armed with an NC prototype;
- A compatibility test where you (in the role of Baby Spice) try to fit Java applets written for Internet Explorer through Navigator-shaped holes;

- A rifle range for shooting radio programmers who play 'Wannabe' just one time too many.

Search engine VI: the viper's birthright

This month, we asked our favourite search engines the question: how many times can the words 'Microsoft', 'marketing' and 'obscene' be found in the same document? The answer, unsurprisingly, is close to 1,000. By far the weirdest of the documents located in this search was the terms and conditions for accessing the Canadian site for Dell Computer. Does Michael Dell know something we don't?

Oh, and Merry Christmas, if you must. ■

Contest: We're with stupid

Stupid people. They're everywhere you look. They're on the buses, they're in the air, you'll find stupid people everywhere. Call us prejudiced, vicious, elitist; we don't care, quite frankly. The world is full of people, and a few too many of those people

might fairly be qualified as morons. Check out our rogue's gallery if you don't believe us.

It should thus come as no surprise that there are some incredibly stupid technologies out

there. For every really useful tool that genuinely changed our lives for the better, there are 10 products that didn't even deserve a place on the drawing board. For this month's contest, we want you to identify those products, and suggest the stupidest item of information technology (hardware or software) that you've encountered in 1997.

The reader who submits the most amusing suggestion will win the decidedly non-stupid prize of a Hayes Accura 56K modem (pictured left). Using high-speed K56Flex technology, the Accura is an easy-to-install solution for budding and experienced Internet users. Feel free to drool.

Enter by sending email to moronic@acp.com.au, or write to Moronic, APC, Level 8, 54 Park Street, Sydney NSW 1028. Entries close December 18, 1997; the winner's name will be published on our Web site. For full terms and conditions, see page 209.



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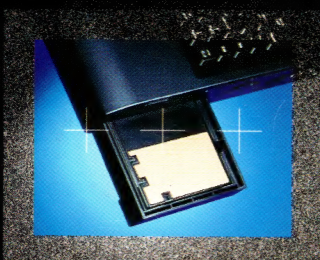
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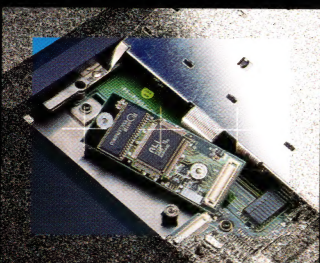
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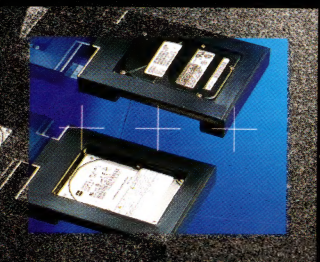
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